



Full Length Research Paper

# Utilization of edible wild plants and their contribution to household income in Gweta Village, central Botswana

Dandy Badimo, Joyce Lepetu and Demel Teketay\*

Botswana College of Agriculture, Private Bag 0027, Gaborone, Botswana

Corresponding author Email: [dteketay@bca.bw](mailto:dteketay@bca.bw), [dteketay@yahoo.com](mailto:dteketay@yahoo.com) and [demelteketa@gmail.com](mailto:demelteketa@gmail.com)

## ABSTRACT

Gweta Village is endowed with a variety of edible wild plants (EWPs) ranging from fruits and leafy vegetables to tubers utilised by the residents. The study focused on documenting and synthesising indigenous knowledge related to the use of EWPs and assess their contribution to household food supply and income in Gweta Village, central Botswana. Data were collected through household survey of forty five households and five key informants. Twenty four species were found that belong to thirteen families, used as source of food and beverage. Most utilised EWPs include *Grewia flava*, *Grewia bicolor*, *Sclorecarya birrea*, *Amaranthus thunbergii*, *Cleome gynandra*, *Corchorus olitorius*. They are the main source of food and income, and are harvested by almost everyone in the Village. About 52% of the respondents were engaged in the sale of nine EWPs, and the sale contributed between BWP 50.00 to more than BWP 400.00 per week. The study showed that women are predominant users and collectors of EWPs and children are regular harvesters in small quantities for consumption as snack. Furthermore, the study revealed that elephants are the major threat to diminishing of EWPs in the Village. Some of the Villagers have already started domestication of some treasured EWPs while others are eager to do so. The prior assumption that EWPs are of significant importance to the rural economy has been confirmed, and the results revealed that EWPs also assist in dietary diversity, food security and income generation. Further research work on EWPs on nutritional value and related health outcomes is needed. Also, there is a need for creating awareness of the public and policy realignment to promote and market EWPs.

**Key words.** Edible wild plant, indigenous knowledge, rural economy, food security.

## INTRODUCTION

Rural communities around the world depend on various edible wild plants (EWPs) in different seasons to supplement both their dietary and income needs (von Maydell, 1986; Scoones *et al.*, 1992; Guijt *et al.*, 1995; Bell, 1995; Maundu *et al.*, 1999; Katende *et al.*, 1999; Ruffo *et al.*, 2002; Asfaw and Tadesse, 2005; Teketay *et al.*, 2010; Assefa and Abebe, 2011; Neudeck *et al.*, 2012; Seyoum *et al.*, 2015). They are relevant to household food security and nutrition in some rural areas particularly drylands, fill seasonal shortage and emergency food during period of hardships. EWPs are of critical importance to the rural communities and source of income more especially to those who live in areas unsuitable for crop production. Rural communities experience elevated unemployment rate and usually consist of larger number of poor people as well as single headed families (Lepetu *et al.*, 2012) who can alleviate

themselves from poverty by sustainable utilization of EWPs around their areas.

EWPs have significant nutritional, economic, ecological and socio-cultural values. For instance, income and employment can be obtained through selling of their fruits, leaves, juice and local drinks. For example, *Sclerocarya birrea* (A. Rich.) Hochst. has an extensive distribution across dryland savannah habitats in the Sub-Saharan Africa. The fruit pulp of *S. birrea* subsp. *caffra*, (Sond.) Kokwaro widely distributed in southern Africa, is used to produce jam, juice, beer and, the internationally available liqueur Amarula Cream in South Africa, the oily kernels are consumed raw, roasted and in sauces. Moreover, the diversity in wild species offers variety in family diet and contributes to household food security because they yield a crop even in poor rainfall years when arable crops fail (Teketay *et al.*, 2010; Legwaila *et*

*al.*, 2011; Neudeck *et al.*, 2012). There are hundreds of indigenous fruit tree species that, although relatively unknown in global markets, are important locally. These can be the focus of domestication, initiatives which could contribute significantly to the livelihoods and nutrition of local people.

Botswana has abundance of EWPs, which grow and produce edible parts successfully despite erratic rainfall. The most common EWPs are leafy vegetables (e.g. *Amaranthus* spp.), and indigenous fruits [e.g. *Azanza garckeana* (F. Hoffm.) Exell and Hillc., *Strychnos cocculoides* Barker, *S. birrea*, etc.] (Ohiokpehai, 2003; Mojeremane *et al.*, 2008; Legwaila *et al.*, 2011). According to Shava (2005), EWPs refer to both indigenous and naturalized exotic plants occurring in the natural environment. Also, EWPs are defined as those plants with edible parts that grow naturally on farmland, fallow or uncultivated land (Ruffo *et al.*, 2002; Asfaw and Tadesse, 2005; Teketay *et al.*, 2010). Traditionally, wild indigenous trees were important sources of vitamins and minerals and played an important role in times of scarcity, and were sometimes used as medicines.

Based on nutritional analysis of edible parts, various authors (Addis *et al.*, 2005; Balemie and Kebebew, 2006) demonstrated that, in many cases, the nutritional quality of wild plants is comparable and, in some cases, even superior to domesticated varieties. EWPs are also associated with treatment or protection of medical conditions such as malnutrition, heart disease, cancer and diabetes (Neudeck *et al.*, 2012).

However, edible wild plant utilization and their benefits have been neglected in Botswana. As a result, traditional knowledge of wild food plants is quickly disappearing and, in most cases, survives only with the elderly (Tardio *et al.*, 2005; Teketay *et al.*, 2010). Furthermore, its potential to contribute to rural economies has been overlooked by policy makers and Government advisers in coming up with strategies that can promote sustainable use as well as promoting their commercialization. A few existing studies have paid attention to profiling and documentation of values and threats to sustainable utilization of medical plants (Andrae-Marobela *et al.*, 2009).

Different publications provide detailed knowledge of EWPs in specific locations in the world. These emphasize how EWPs are critically important to the different societies. A study by Saleh (2010) in Jordan northern Villages of Ajlun revealed that some poor households rely on wild fruits for a quarter of all dry season's meal. Likewise, in northern region of Nigeria, leafy vegetable and other bush foods are collected as daily supplements to relishes and soup (Loghurst, 1986). Moreover, Alkinnifesis *et al.* (2004) noted that 60-80% of the rural people in the southern Africa face food shortage for 3-4 months in a year and use indigenous EWPs to sustain their livelihoods. In Botswana, an estimated 150 edible

wild and semi-wild plant species are reported used by rural communities all the time or during famine (Flyman and Afolayan, 2006). Nevertheless, a study on EWPs in Gweta Village has never been carried out to explore and recognise their relevance to the Villagers. This study, therefore, sought to explore and document the EWPs in Gweta Village as well as appreciating their contribution to household income generation and rural food security.

The general objective of the study was to document and synthesize indigenous knowledge related to use of EWPs and assess their contribution to household food supply and income in Gweta Village. The specific objectives of the study were to: (i) identify the type and number of plants species used as source of food in Gweta Village; (ii) determine the contribution of EWPs to consumption and income generation of households in Gweta Village; (iii) assess the conservation status of the EWPs identified; and (iv) assess potentials of the EWPs for domestication and better use in the future.

## MATERIALS AND METHODS

### Study area

Gweta is a Village located in Central District and fall under Central Tutume Sub-District (CSO, 2011). It lies about 205 km from Maun, 100 km from Nata and 722 km from Gaborone. The Village is situated about 2km south of the road between Nata and Maun road (Figure 1) and geographical located between 20°11'11" S and 25°17'46" E. The Village is convenient for exploring Makgadikgadi and Nxai Pan. It is, therefore, regard as the gateway to those wildlife habitats that attract thousands of animals and bird species in summer, mostly zebras, wildebeest and elephants, which migrate into the area in large numbers. Vegetation in the area is termed Mopane woodland, with predominant *Colophospermum mopane* (J. Kirk ex Benth.) Kuntze and arenosols soils (Morebodi, 2001). This area is interspersed by numerous waterholes, which fill after summer rainfall and dry out mostly during winter months. Gweta Village is semi-arid with average rainfall of 200 and 500 mm as well as maximum temperature of 32 °C in summer and a minimum of 6 °C in winter ([www.madbookings.com](http://www.madbookings.com), accessed on 08-09-2013).

Gweta Village has a population of 5,304 as of 2011 house population census showing an increase from 4,055 population projected in 2001 population census (CSO, 2011). The area is occupied by diverse ethnic groups comprising Banajwa, Basarwa, Bahurutshe and Bakalanga. The Villagers are dependent on subsistence agriculture, growing of traditional crops, such as maize, sorghum and beans and rearing of cattle in small scale in free range system.



**Figure 1.** Map of Botswana showing the location of the study area (source: <http://www.aircraft-charter-world.com/airports/africa/botswana.htm>, accessed on 27-08-2015).

## Data collection

Two data collection methods were employed, namely key informants interviews (KIIs) and household survey (HHS).

In the household survey an interview schedule was prepared and used during face to face household interviewing of selected participants, open and closed ended questions was asked to avoid restricting the participants answers and to give the respondents control over what they wish to say as well as how they wish to say it. They enable respondents to express their opinions and perspectives freely as well as unearthing the unexpected. Stratified random sampling of the population by wards was carried out and within the wards simple random sampling was used to choose households and 50 residents was sampled and interviewed. Random sample imply that all members of the community have equal chance of being included to avoid bias in favour of particular group. Additional members were sampled so that they can be interviewed when the initial sampled members are not available.

For the key informant interviews, knowledgeable people in the Village, amongst them Village Chief, elders, women, VDC members and some government agents, were chosen purposely since they had been identified as repositories of the knowledge in some previous study undertaken. Purposive sampling of participants was conducted in order to have an in-depth focus on issues important to the study. A list of questions was prepared, to assist in drawing necessary data from the participants. The interview was conducted with a single person at a time. This allowed people to express their personal view,

discussing disagreement in the community and speaking freely without being contradicted by others.

## Data analyses

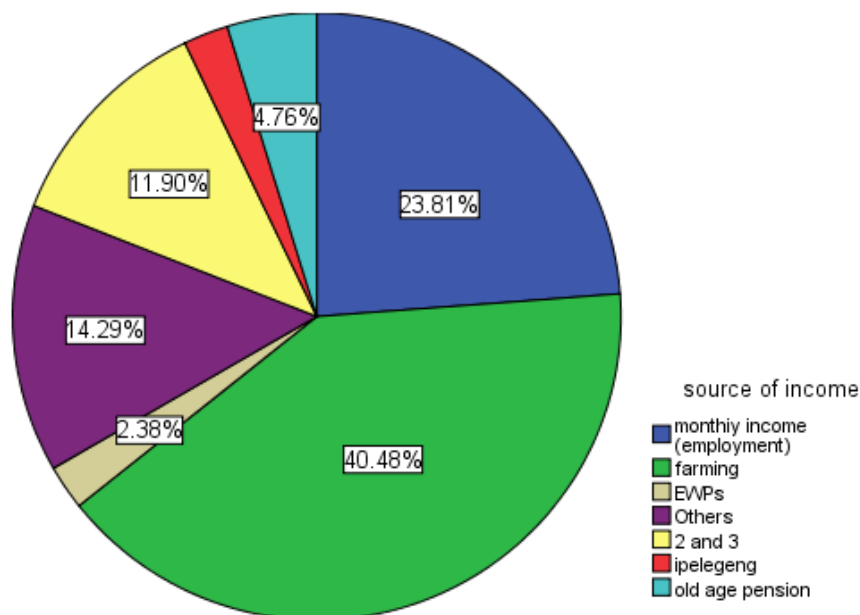
Following data collection, validation and coding of data collected through the questionnaire was carried out for easier capturing and analysing. Two computer programmes namely Microsoft Excel and statistical package of social sciences version 16 were used in performing the analysis.

Descriptive and chi-square analyses were performed to determine the relationship between levels of harvesting or utilization with various demographic and socio-economic factors, such as income, size of household and level of education of household members.

## RESULTS

### Demographic and socio-economic characteristics of households

A total of 50 respondents were interviewed through both household survey and key informant interviews. The majority of the respondents (81 %) were female. The analyses depicted that female-headed families were common, making up to about 77 % (*de facto* female 40% and *de jure* female 37%) and 23 % were male-headed families. Furthermore, the majority of the respondents



**Figure 2.** Sources of income of respondents in Gweta Village, Botswana (2 = farming and 3 = EWPs).

were never married, with a share of more than 51%, followed by widowed and married couple occupying 30 to 12%, respectively, as well as those living together and divorced with shares of 5 and 2%, respectively.

Gweta Village is predominantly occupied by Bakalaka, Bananjwa and Bakhurutsi ethnic groups, with a share of 35, 26 and 23%, respectively. Of the sampled respondents, Basarwa made 12% and Bayei and Baherero were the minority (less than 4%). Education level ranged from no formal education (37%) followed by primary scholars (35%) and secondary scholars (21%) and lastly, tertiary scholars (post-secondary) (7%). The main sources of income of the sampled households were farming (40.48%) and monthly salaries (23.81%) (Figure 2). Some income source revealed by the respondents included old age pension, firewood sales, bread baking and selling as well as selling EWPs.

### Number and species composition of EWPs

A total of 24 EWPs used for food and beverage were recorded in Gweta Village, of which three could not be identified (Table 1). The EWPs identified belong to at least 13 and 16 different families and genera, respectively, with Tiliaceae family and the genus *Grewia* dominating. Moreover, EWPs with "fruit" as edible part dominated (66%), followed by leafy vegetables (20.8%) and tubers (12.5%). Most of the fruits are consumed as snacks (83%), with only a few that can be prepared as a whole meal (e.g. *Adonsonia digitata* L. fruits mixed with fresh milk). Leafy vegetables are basically eaten as part of

meals, and tubers are usually used to quench thirst (Figure 3).

The respondents explained that most of these EWPs were abundant and commonly utilized in the past than today. They indicated that these days, there is a decline in EWPs utilisation and availability due to lack of rainfall as well as heavy rainfall during flowering and ripening stages, causing fruit loss.

The majority of the respondents harvest a quantity of EWPs between 11-20 kg, especially of *Grewia* species and leafy vegetables (*Amaranthus thunbergia* Moq., *Cleome gynandra* L., *Corchorus olitorius* L.) for sale and consumption weekly. Furthermore, about 30% of the respondents revealed that they only harvest in small quantity, just in pockets for immediate consumption, and EWPs, such as *Mimusops zeyheri* Sond., *X. imenia Americana* L., *X. caffra* Sond., *Ceropegia rendallii* N. E. Br. and *Fockeaean gustifolia* K. Schum., are also harvested in small quantities by almost all respondents. Harvesting of large quantities (more than 50 kg) is common for *Scloreocarya birrea* (A. Rich.) Hochst. (for beer making), *Hyphaene petersiana* Klotzsch ex Mart. and also for those who highly dependent on the sale of *Grewia flava* DC. and *G. bicolor* Juss.

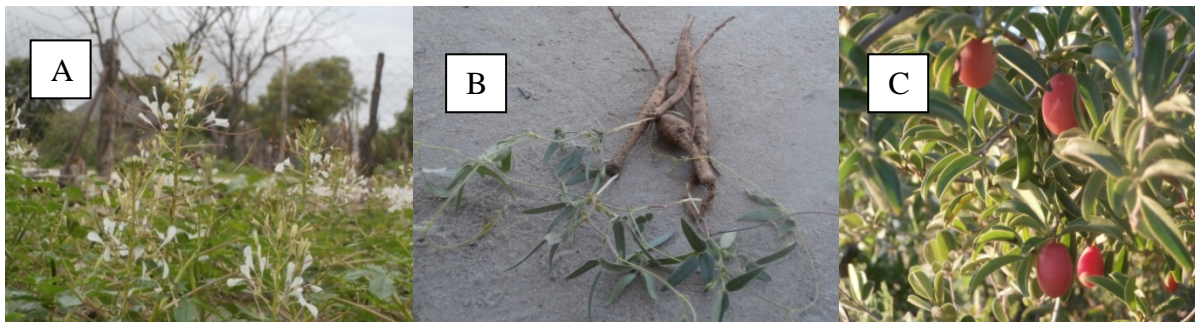
About 52% of the EWPs are harvested outside the Village covering minimum and maximum distances of one to 60 km, respectively. The leafy vegetables harvested in the Village represent 21% of the species and 28% of the species are harvested both outside and within the Village. The respondents highlighted that time and frequency of harvesting varies from plant to plant depending on



**Table 1.** Edible wild plants reported to grow and be used for food in Gweta Village, Botswana.

Species	Family	Local names	Edible part
<i>Adansonia digitata</i> L.	Bombacaceae	Mowana	Fruit
<i>Amaranthus thunbergia</i> Moq.	Amaranthaceae	Thepe	Leafy vegetable
<i>Azanza garkeana</i> (F. Hooffm.) Excell & Hillc.	Malvaceae	Morojwa	Fruit
<i>Berchemia discolor</i> (Klotzsch) Hemsl.	Rhamnaceae	Motsintsila	Fruit
<i>Ceropegia rendallii</i> N.E. Br.	Asclepiadaceae	Serowa	Tuber/Roots
<i>Cleome gynandra</i> L.	Capparaceae	Rothwe	Leafy vegetable
<i>Corchorus olitorius</i> L.	Malvaceae	Delele	Leafy vegetable
<i>Fockea angustifolia</i> K. Schum.	Asclepiadaceae	Leruswa	Tuber/Roots
<i>Grewia avellana</i> Heirn	Tiliaceae	Marago-a-Bahumagadi	Fruit
<i>Grewia bicolor</i> Juss.	Tiliaceae	Mogwana	Fruit
<i>Grewia flava</i> DC.	Tiliaceae	Moretwa/Moseme	Fruit
<i>Grewia retinervis</i> Burret	Tiliaceae	Motsotsojane	Fruit
<i>Grewia schinzii</i> K.Schum	Tiliaceae	Mokgomphate	Fruit
<i>Hyphaene petersiana</i> Klotzsch ex Mart.	Arecaceae	Mokolwane	Fruit
<i>Mimusops zeyheri</i> Sond.	Sapotaceae	Mmupudu	Fruit
<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	Anacardiaceae	Morula	Fruits
<i>Tylosema esculentum</i> (Burch.) A. Schreiber	Fabaceae	Morama	Fruit
<i>Schinziophyton rautanenii</i> (Schinz) Radcl.-Sm.	Euphorbiaceae	Mokongwa	Fruit
<i>Ximenia americana</i> L. var. <i>americana</i>	Olacaceae	Moretologa-wa-Pudi	Fruit
<i>Ximenia caffra</i> Sond. var. <i>caffra</i>	Olacaceae	Moretologa-wa-Kgomo	Fruit
<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	Rhamnaceae	Mokgalo	Fruit
Unidentified sp.		Mokgothwane	Tuber/Roots
Unidentified sp.		Mahubala	Tuber/Roots
Unidentified sp.		Mmankedibonye	Leafy vegetable

\* Plant nomenclature follows that of Setshogo (2005).



**Figure 3.** Pictures of: (A) *Cleome gynandra* L. (leafy vegetable), (B) *mokgothwane* (tuber) and (C) *Ximenia caffra* Sond. (fruit).

availability of edible plants or parts. However, 62% harvest regularly during the season and 38% occasionally during the summer season. Eighteen (46%) respondents revealed that they use head loading as a method of transport, and other methods include donkey carts, hand and vehicles.

### Contribution of EWPs to food supply and income generation

Respondents depend less on EWPs for their food supply with about 72% indicating that the contribution of EWPS

to food supply is less than 25%, and only about 14% of the respondents depend on EWPs for about 76-100% of their food supply. Prior to the study, it was assumed that households with low income (resource-poor households) were highly dependent on EWPs than resource-rich households. The expectation was that those with unsustainable income will harvest EWPs in large quantity than those with sustainable income. However, after comparing the quantity collected and wealth status, the expectation could no longer be supported (Chi square test,  $P > 0.05$ ).

**Table 2.** Common EWPs sold in the markets of Gweta Village and their prices.

Species	Price per unit	Price after processing
<i>Adansonia digitata</i>	P*1-5 fruit <sup>-1</sup>	
<i>Hyphaene petersiana</i>	P0.25 -1 fruit <sup>-1</sup>	
<i>Amaranthus thunbergii</i> <sup>+</sup>		P5 mug <sup>-1</sup>
<i>Corchorus olitorius</i> <sup>+</sup>		P5 mug <sup>-1</sup>
<i>Cleome gynandra</i> <sup>+</sup>		P5 mug <sup>-1</sup>
<i>Grewia flava</i>	P5 mug <sup>-1</sup>	
<i>Berchemia discolor</i>	P3- 5 mug <sup>-1</sup>	
<i>Sclorecary abirrea</i>		P1 cup <sup>-1</sup> of beer, P35 750ml <sup>-1</sup> bottle of nuts
<i>Grewia bicolor</i>	P5 mug <sup>-1</sup>	P1 cup <sup>-1</sup> of beer

\*BWP = Botswana Pula, 1 BWP = 8.93 USD at the time of the write-up of the report; <sup>+</sup> = Dried leafy vegetables.



**Figure 4.** (A) Baobab fruit (*A. digitata*) and (B) dried *thepe* (*A. thunbergii*) sold by local people.

About 52% of the respondents are engaged in sales of EWPs, and almost every respondent purchases EWPs in different places that include markets, roadsides, neighbours, mobile sellers and hawkers. Commonly sold and bought EWPs include *G. flava*, *G. bicolor*, *A. thunbergii*, *C. olitorius*, *C. gynandra*, *S. birrea* and *A. digitata* (Table 2, Figure 4). The basic reason for acquisition of EWPs is for consumption compared with buying and selling, except as source of ingredient for local brewing. Common weekly average sales of EWPs obtained by respondents (65.22%) fell between BWP50.00 – 100.00 (range = BWP 50.00 -100.00 to > 401.00). *Grewia bicolor* was indicated as potential commercial product because of its abundance and long shelf life and is, mainly, used in beer making (locally known as *khadi*), which can be consumed all year round.

### Domestication prospects of EWPs

About 51% of the respondents had a perception and belief that EWPs cannot be cultivated and have never tried planting them as they are naturally growing plants and taken care of by God. Some respondents indicated that cultivation of certain EWPs is against cultural values and beliefs. However, 49% of the respondents see

domestication of EWPs as a good and useful thing, and the majority of them have tried and planted them in their back yards (Figure 5). *Cleome gynandra*, *A. garkeana*, *G. flava*, *G. bicolor* and *H. petersiana* were common potentially domesticable EWPs mentioned by the villagers.

### Threats to EWPS

It has been revealed that harvesting of EWPs in Gweta Village is performed sustainably with minimal effect on mother plants or population by Villagers. However, the respondents are crying over the inconsiderate and overexploitation of EWPs by “outsiders” as they are careless and, usually, overharvest the EWPs leading to slow regeneration capacity and poor vegetation succession. Another major concern is destruction of EWPs by wild animals, especially elephants that have eroded availability of EWPs and resulted in difficult access to certain plants that used to be abundant in the Village proximity.

### DISCUSSION

Harvesting and selling of EWPs is carried out by women compared with men, and most of the households are



**Figure 5.** *Cleome gynandra* (locally known as *rothwe*) grown in the backyard in Gweta Village.

female headed. Women explore different means to meet food supply of their family and supplement their source of income to meet family needs. Moreover, women are more knowledgeable than men and so attached to nature. This result concurs with those reported by Ruiz-Perez *et al.* (1999) and Shackleton (2004). Women understand the production cycle of various EWP, and this goes to an extent of distinguishing different products from different trees. For instance, they could identify which tree produces sweet fruit and the colour of nut from different trees. However, relevant authorities are still reluctant or unable to take into consideration this vital factor to formulate policies and regulation in line with utilization of EWPs.

Basarwa have indicated that they rely on EWPs for 76-100% for their food supply yearly. It is because they are mostly non-farmers and are dependent on government food baskets and poverty alleviation program (*ipelegeng*) for their source of income. However, others tribes are active farmers and depend heavily on farming, and they have disclosed that ripening of most of the EWPs that they regard important conflict with ploughing season. For example, ripening of *G. flava* and *G. bicolor* occurs during ploughing and weeding time. Hence, most of the respondents collect EWPs in small quantities. Some collection is performed in conjunction with some daily activities, such as weeding and collection of firewood (Legwaila *et al.*, 2011)

Plant species of the study area are generally diverse and serve various purposes to individuals. Although a total of 24 species have been identified in Gweta, only about less than a quarter of them are harvested by majority of the respondents, including species with leafy vegetable and those species in the Tiliaceae family. A similar study conducted in Benna Tsemay District, Ethiopia, by Assefa and Abebe (2011) indicated that these are families that had the highest number of EWPs utilized by residents. Leafy vegetable form an important part of the meal, especially during the raining season when it is abundant. Furthermore, fruit species of

Tiliaceae are highly enjoyed by the majority of respondents and highly saleable. Some of the species identified are reported to be utilized elsewhere in Botswana and other parts of Africa. Assefa and Abebe (2011) recorded four EWPs reported in Bemba Tsemay District in Ethiopia while Legwaila *et al.* (2011) recorded six EWPs, and fourteen were recorded by Neudeck *et al.* (2012) in Shorobe, Botswana.

Accessibility of EWPs also differed. Species with leafy vegetable are mainly harvested within the Village as they grow in backyards. They are allowed to grow with other food crops even though they are considered weeds. This indicates the innovativeness of the rural culture, and it might be a step towards the domestication of such leafy vegetable species (Shava, 2005). Tree and shrub EWPs are found outside the Village. They are commonly cleared for residential plots. As a result, they are found some distance from the Village.

However, some residents leave behind some of the EWPs and spare them as resources depending on what they could offer. Women harvest EWPs, especially leafy vegetable, regularly during the rainy seasons or summer since they become scarce during the dry season. So, they are often harvested, processed and stored for use during the dry season as sources of food and cash income. The principal method of extending their shelf life is by sun drying (Legwaila *et al.*, 2011).

As 72% of the respondents revealed the fact that EWPs contribute less than 25% of their food supply yearly indicates that Gweta residents are less reliant on EWPs since the majority are active farmers. However, their significance cannot be overlooked since about 14% of the respondents mentioned that they depend highly on EWPs for a year long. EWPs form a significant share of common traditional meals that are eaten by the majority of population, both the poor and rich, which contradicts with findings from Balemie and Kebebew (2006) who reported that EWPs are important for the poor. The rich have an advantage as they have money and means of transport to reach some distant areas as well as hiring



people to harvest for them.

In Gweta, EWPs are sold by women and children, especially in informal markets. For example, boys usually go around selling *A. digitata* and *H. petersiana* (Babitseng and Teketay, 2013) fruits that are harvested by knocking fruits down by stones or sticks. The markets are usually limited and sales are conducted from door to door, at bus stops and roadside markets. The sales of EWPs provide income used to meet several family needs (Shackleton *et al.*, 1998; Kadu *et al.*, 2006; Neudeck *et al.*, 2012), such as purchasing of food, paying school fees and usually buying various snacks by children. *Grewia bicolor* is of significance to residents, and it is mainly used for making local beer (*khadi*) all year round and, thus, contributing consistently to family income, and some of the respondents rely on *khadi* as their source of sustained income.

EWPs are relatively cheaper and their prices are even lower in summer time when they are abundant, hence, the majority of sellers obtain between BWP50.00 and 100.00 per week. In spite of an increase in the utilization of wild fruits, processing and value addition have not been improved. Hence, they sell the EWPs at low prices, and this was also stressed by Feyssa *et al.* (2010) as an outstanding area that needs emphasis in development plans. This also needs further policy and local level awareness creation on the value of EWPs and improve their uses. Otherwise, when the prices remain little, a large amount of the harvest from the wild will be required to get more money, and this can threaten the wild populations (Feyssa *et al.*, 2010). The facts that almost everyone buys EWPs indicate that EWP can be sources of employment and contribute significantly to the local economy.

About half of respondents disagreed to the initiative of domestication of EWPs. They believe that EWPs are naturally growing plants and taken care of by God. Hence, they do not see any reasons of committing themselves to planting them. The most common problem in attempting to domesticate EWPs is the lack of understanding of the best method to adopt. Others revealed that they have never seen any EWPs planted. For instance, they said that they always eat and throw away seeds of *G. bicolor* or *G. flava* in the backyard, but have never seen them germinating. Some indicated that planting of certain EWPs is against their cultural belief since they are regard to bring bad luck to the family when planted in the back yard.

Respondents have revealed that most of the EWPs harvesters of Gweta do it in a sustainable way without using destructive methods, such as cutting or damaging of the mother plants. However, the residents emphasised that outsiders, those who come from nearby Village to harvest EWPs, are usually inconsiderate as they often cause some wild fire, clearing some trees when camping, thus, destroying the EWPs. Also, they usually

overharvest, going to an extent of harvesting unripe fruits since they are after money. This result concurs with that reported by Neudeck *et al.* (2012) from Shorobe where this was also a concern of the respondents. Furthermore, residents have a major concern about how EWPs that are used also for medical purpose are overexploited and overharvested. When people dig up their root for medicinal purpose, they leave the roots uncovered and trees often die. Again, animals, especially elephants, are said to account for the major destruction of EWPs as they uproot trees. All these factors have been attributed to the loss of habitat and depletion of EWPs (Motlhanka and Makhabu, 2011).

## CONCLUSIONS AND RECOMMENDATIONS

EWPs are of significant relevance to rural economic resilience, diversification, poverty alleviation and nutritional balance in remote areas. They contribute largely to the livelihood of Gweta residents in terms of dietary diversity, food security and as sources of income. The majority of people depend on them in varied seasons and circumstances. However, EWPs are heavily utilised during summer when they are abundant and processed for off season use. Most EWPs are nutritionally rich and help curb malnutrition, especially in rural areas like Gweta. Leafy vegetable species, which were revealed to form part of the meal for most residents in Gweta, are commended for high nutritional value and can be recommended by health practitioners.

The EWPs are utilised differently by varies groups. For instance, resource-poor individuals are basically dependent on EWPs for food supply but resource-rich individuals are mainly involved on sales. However, women are predominantly users of EWPs, and this distinction is still not recognised for policy and programme alignment. Nevertheless, with the advent of relief aid through food assistance programmes, the use of some EWPs is diminishing. Recurring environmental changes require innovation, such as incorporating EWPs into the cropping systems to enhance food security as they are adapted to local conditions. Nonetheless, more research on selection, development, promotion and marketing is required.

There is still an enormous work to be done to develop, promote and market EWPs. Awareness and sensitising communities about the value and benefits of EWPs should be a priority in the rural economy. Land allocators should always conduct cost-benefit analyses before allocation of land either for arable agriculture or residential plots. This will help in the protection and conservation of valuable EWPs in different localities. Most EWPs treasured by the Villagers are said to have been swept away due to inconsiderate clearing of land for human use. Policy amendments recommended to



properly utilise and manage EWP.

Moreover, research should be carried out on nutritional analyses and health significance of EWP to enable formal interventions that encourage use of those EWPs as resource of essential nutrients. Hence, promotion and domestication of EWPs should be emphasised by both government and non-government organizations.

## ACKNOWLEDGMENTS

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