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Full Length Research Paper

Enhancing food security through cultivation of traditional food crops in Nhema communal area, Midlands Province, Zimbabwe

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The aim of the present investigation was to document the contribution of traditional food crops to food security in Nhema communal area, Midlands Province, Zimbabwe. The study employed oral interviews and detailed discussions with 78 participants. A total of 23 plant species were identified as important traditional food crops in Nhema communal area. The most commonly grown traditional food crops were *Arachis hypogea* (groundnut), *Zea mays* (maize), *Vigna subterranean* (bambara groundnut), *Ipomoea batatas* (sweet potato), *Cucurbita maxima* (pumpkin) and *Vigna unguiculata* (cow pea). Traditional food crops in Nhema communal area were mainly used as leafy vegetables (40%), followed by edible seeds (20%), cereals (17%), edible fruits (13%), edible stems (7%) and edible tubers (3%). Food production was found to be the major function of traditional food crops but crop surplus was often marketed in local markets to raise cash income. The highest mean annual cash income generated by a household through selling of traditional food crops was $193.70. These findings are discussed in the context of how traditional food crops are utilized by rural communities in meeting household's food needs.

Key words: Cash income, food security, traditional food crops, Zimbabwe.

INTRODUCTION

Cultivated agricultural biodiversity together with wild edible organisms provide rural communities with food resources. Although people consume approximately 7,000 plant species, only 150 species are commercially important and about 103 species account for 90% of the world's food crops (Zhou, 2001). According to FAO (1996), net food production has increased, but over 50% of the daily global requirements of carbohydrate and protein needs are met by only three crops: maize, wheat and rice. According to Azam-Ali (2007), major crops grown as monocultures have failed to make Africa food secure. But multi-cropping agricultural system managed mainly by subsistence rural farmers and composed mostly of underutilized, subsistence and traditional food crops still forms the basis of subsistence agriculture in sub-Saharan Africa. These crops include cereals, fruits, nuts, oilseeds, pulses, tubers and vegetables. Traditional multiple cropping systems still provide as much as 20% of the world food supply (UNDP, 1995). However, this category of food crops is notably disregarded in the agricultural development agenda even though they have shown significant potential in enhancing food security. Traditional food crops are not normally subject to agricultural policy, research and extension activities but are consumed almost daily, particularly in rural communities. Furthermore, knowledge concerning the uses and management of these species is likewise often localized and specialized (Sasvari et al., 2010).

There is a growing realization worldwide that agricultural biodiversity is fundamental to agricultural production and food security, as well as a valuable ingredient of environmental conservation (Thrupp, 2000). Food security, at the individual, household, national, regional, and global levels is achieved when all people at all times, have physical, social, and economic access to sufficient, safe and nutritious food to meet their dietary

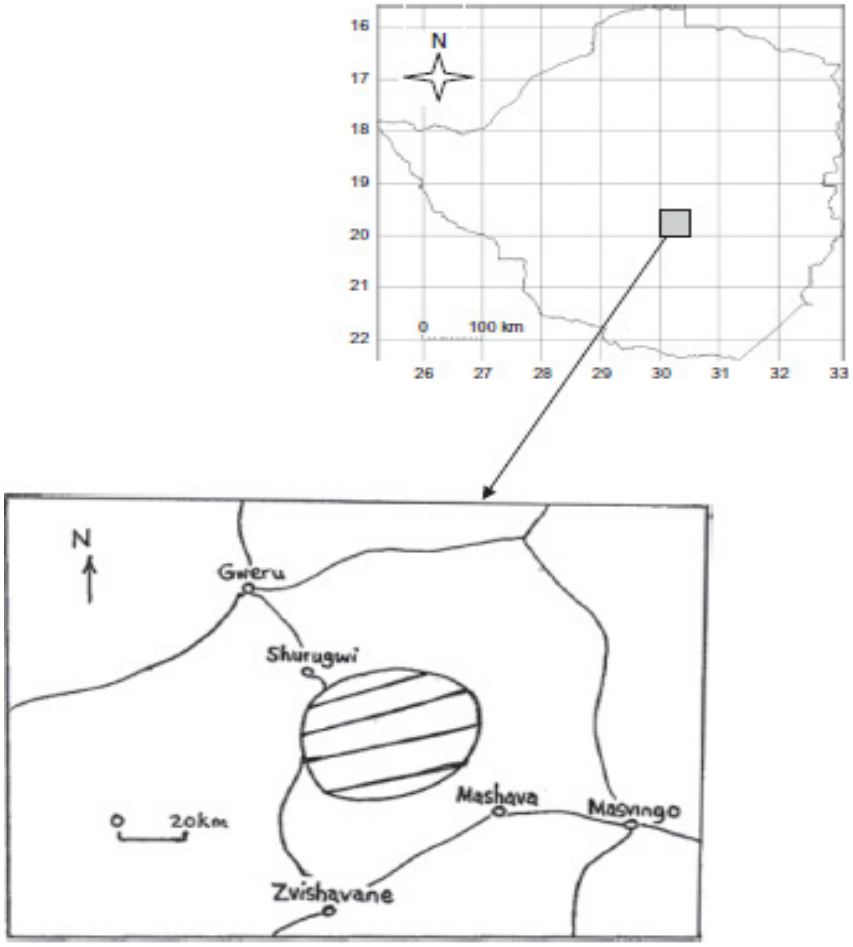

Figure 1. Geographical location of the study area. Upper: map of Zimbabwe illustrating position of Nhema communal area; lower: detailed map of the study area.

needs and food preferences for a healthy and active life (FAO, 2001). Food security is essentially built on three pillars: food availability, food access and food utilization (World Bank, FAO, IFAD, 2009). It is within this context that the contribution of traditional food crops to food security was evaluated in Nhema communal area, Midlands Province, Zimbabwe.

For most parts of Zimbabwe, this rich indigenous knowledge on traditional food crops is not adequately documented; although there have been a few attempts to document the role of such plants as a source of community resilience in the Midlands Province (Shava et al., 2009), uses of wild edible plants (Maroyi, 2011a; Shava, 2005) and the potential role of traditional vegetables in household food security (Maroyi, 2011b). This investigation is part of a larger study currently underway in the same study area (Maroyi, 2011a), aimed at documenting the ethnobotanical knowledge held by the local communities of Nhema communal area, Zimbabwe. Therefore, the present study was aimed at documenting the contribution of traditional food crops to food security in Nhema communal area, Zimbabwe.

MATERIALS AND METHODS

This paper is based on a case study in Nhema communal area (Figure 1), centrally located in the Midlands Province of Zimbabwe. Nhema communal area lies between 19° 57' S to 20° 30' S latitude and 30° 00' E to 30° 58' E longitude. The area lies in agro-ecological region 3, a semi-intensive agricultural region characterized by annual rainfall of between 650 to 800 mm a year (Vincent and Thomas, 1961). The current study is part of a larger study, currently underway in the same study area and details of geography, climate, phytogeography and major economic activities are given in Maroyi (2011a).

Field studies were carried out in four villages: Chikato, Donga, Hanke and Tongogara (Figure 1). Prior to any contact with the local people, the study and its objectives were introduced to the local traditional leaders explaining the purpose of the research. Once the traditional leaders granted permission to proceed, individuals were approached for participation. The individuals were selected using wealth ranking (Grandin, 1988) to ensure that different wealth

Table 1. Socio-demographic characteristics of participants interviewed in Nhema communal area, Midlands Province, Zimbabwe.

Characteristics	Number	%
Gender		
Female	45	57.7
Male	33	42.3
Age (years)		
21-30	8	10.3
31-40	19	24.4
41-50	26	33.3
51-60	15	19.2
61-70	7	9
>74	3	3.8
Household size		
1-2	2	2.6
3-4	11	14.1
5-6	35	44.9
7-8	23	29.5
>9	7	9
Relationship to household head		
Head of household	55	70.5
Spouse	17	21.8
Children	6	7.7
Highest level of education attained		
No education	5	6.4
Primary	38	48.7
Secondary	32	41
Tertiary	3	3.8
Occupation		
Unemployed	58	74.4
Civil servant	4	5.1
Pensioner	9	11.5
Other	7	9

categories were represented in the study. Individual oral interviews were conducted with 78 participants between December 2011 and January 2012. Verbal informal consent was obtained from each individual who participated in the study and the researcher adhered to the ethical guidelines of the International Society of Ethnobiology (International Society of Ethnobiology, 2006). The interviews were conducted in Shona language since the author is a native speaker of the language. The aim and purpose of the investigation was explained to all participants. Interviews were conducted individually whenever possible in an attempt to avoid any direct influences from third parties and to assure that the data supplied by the informant were as direct and reliable as possible (Phillips and Gentry, 1993). Like in the previous study, the so called participatory rural appraisal (PRA) methods were used (Chambers, 1994) to systematically collect data and information as follows:

1. Socio-demographic characteristics of participants;
2. Names of the traditional crops grown;
3. Uses and preparation of crop;
4. Impacts traditional food crops have on food security and poverty and;
5. Other benefits derived from cultivation of traditional food crops.

Traditional food crops mentioned during the interviews were collected. Voucher specimens were deposited for future reference at the National Herbarium, Harare, Zimbabwe.

RESULTS AND DISCUSSION

Table 1 shows the demographic characteristics of the participants. Most (70.5%) of the participants were heading households. Of the seventy-eight participants, 57.7% were female and 42.3% were male. Their ages ranged from 21 to 74 years, with 46 years as the median. The majority of households (88.5%) comprised between 3 and 8 family members, while 2.6% comprised 1 to 2 family members and 9% had more than 9 family members (Table 1). The majority (48.7%) of the participants were educated up to primary level, while 41% had attained secondary education, 6.4% were illiterate and 3.8% had attained tertiary education. About 58% of the participants were unemployed.

The study recorded twenty-three (23) traditional food crops in Nhema communal area (Table 2). The diversity of traditional food crops grown by subsistence farmers in Nhema communal area enabled them to produce several crop outputs (Table 2). Interviews with participants revealed that no single traditional food crop was sufficient to meet household food requirements. Among the main uses of traditional food crops were leafy vegetables (40%), followed by edible seeds (20%), cereals (17%), edible fruits (13%), edible stems (7%) and edible tuber (3%) (Figure 2). The vegetable dishes were prepared mainly as relish which accompanied maize, millet and sorghum porridge. Young leaves and shoots were boiled with salt and fried in cooking oil with other ingredients such as tomatoes and onions. Peanut butter was sometimes used instead of cooking oil.

The leafy vegetables were also cooked mixed with meat. By growing a diversity of traditional food crops, subsistence farmers in Nhema communal area were able to produce different household food necessities. Previous research by Azam-Ali (2007) emphasized the need to harness the huge repository of indigenous plant species cultivated and conserved by local communities for many generations across variable climates to meet household food security and nutrition. *A. hypogea* (edible seed), *C. maxima* (leafy vegetable, edible flowers, fruits and seeds), *I. batatas* (edible tubers), *V. subterranean* (edible seeds), *V. unguiculata* (leafy vegetable, edible seeds and fruits) and *Z. mays* (cereal) were grown by at least 80% of the participants (Table 2). *Z. mays* was the dominant cereal crop and the staple food crop in Nhema communal area, with its dried seeds and green mealies prepared in several ways (Table 2).

The importance of traditional food crops for local livelihoods was ubiquitously perceived, with all participants reporting their contribution towards food security and nutrition (Table 3). About a third of the participants (34.6%) reported the contribution of traditional food crops

Table 2. Traditional food crops grown in Nhema communal area, Midlands Province, Zimbabwe. Language abbreviations: English (E) and Shona (Sh).

Scientific name	Common name	Food type	Food preparation	% of households that grow the crop
Arachis hypogea L.	Groundnut (E), Nzungu (S)	Edible seed	Seed eaten raw or cooked. Seed is also roasted into snack or ground into peanut butter. Shelled seeds and unshelled fruits preserved for later use	100
Zea mays L.	Maize (E), Chibage (S)	Cereal	Dry seed boiled, roasted, grounded into mealie meal or pounded into samp. Green mealies roasted, cooked or baked into bread. Dried seed preserved by application of pesticides before storage	100
Vigna subterranean L.	Bambara groundnut (E), Nyimo (S)	Edible seed	Seeds cooked as a meal. Seeds also roasted into a snack. Shelled seeds and unshelled fruits preserved for later use	93.6
Ipomoea batatas (L.) Lam.	Sweet potato (E), Mbambaira (S)	Edible tuber	Tubers eaten raw or cooked and eaten on their own; but often replace bread during breakfast	91.0
Cucurbita maxima Duchesne ex Lam.	Pumpkin (E), Muboora (S)	Leafy vegetable, flowers, fruit and seed edible	Leaves, flowers and young fruits cooked as leafy vegetable. Cooked fruit edible and seeds roasted into snack. Fruits, seeds and sun dried leaves stored for later consumption	89.7
Vigna unguiculata (L.) Walp.	Cowpea (E), Munyemba (S)	Leafy vegetable, edible seed and fruit	Leaves cooked as relish, seeds and young fruits cooked into a meal. Shelled seeds, unshelled fruits and sun dried leaves stored for later use	82.1
Lycopersicum esculentum Mill.,	Tomato (E), Mutomatisi (S)	Leafy vegetable	Added to vegetables or meat	79.5
Cleome gynandra L.	Spider flower (E), Nyovhi (S)	Leafy vegetable.	Leaves cooked as leafy vegetable. Leaves sun dried for later consumption	65.4
Allium cepa L.	Onion (E), Hanyanisi (S)	Leafy vegetable	Added to vegetables or meat. Bulbs preserved for later consumption	61.5
Lageneria siceraria (Molina) Standl.	Gourd (E), Makavhu (S)	Leafy vegetable, edible fruit pulp and seed	Young leaves cooked and eaten as relish. Cooked fruits edible and seeds roasted as a snack. Dried seeds preserved for later use	35.9
Brassica rapa L.	Rape (E), Repi (S)	Leafy vegetable	Leaves cooked on their own or mixed with meat. Leaves sun dried for later consumption	26.9

Table 2. Contd.

Citrullus lanatus (Thunb.) Mansf.	Watermelon (E), Vise (S)	Edible fruit, seed	Edible fruit pulp. Ripe fruits and dried seeds stored for later use	17.9
Cucumis metuliferus E. Mey. ex Naudin	Spiny cucumber (E), Mugaka (S)	Edible fruit pulp	Edible fruit pulp. Ripe fruit stored for later use	16.7
Brassica oleracea L.	Cabbage (E), Kabegi (S)	Leafy vegetable	Leaves cooked on their own or mixed with meat. Leaves sun dried for later consumption	14.1
Sorghum bicolor (L.) Moench	Sorghum (E), Mapfunde (S)	Cereal, edible stem	Sweet stem chewed. Stem also pealed, sun dried and stored for later consumption. Dried seed preserved by application of pesticides before storage	17.9
Cucumis anguria L.	Wild gherkin (E), Muchacha (S)	Leafy vegetable	Leaves cooked as leafy vegetable. Leaves sun dried for later consumption	11.5
Brassica carinata A. Braun	Covo (S)	Leafy vegetable	Leaves cooked on their own or mixed with meat. Leaves sun dried for later consumption	12.8
Saccharum officinarum L.	Sugarcane (E), Nzimbe (S)	Edible stem	Sweet stem chewed. Stem also pealed, sun dried and stored for later consumption	15.4
Brassica juncea (L.) Czern.	Tsunga (S)	Leafy vegetable	Leaves cooked on their own or mixed with meat. Leaves sun dried for later consumption	10.3
Pennisetum glaucum (L.) R. Br.	Pearl millet (E), Mhunga (S)	Cereal	Seed is ground into powder and cooked into thick porridge. Seeds also pounded and fermented into traditional beer. Dried seed preserved by application of pesticides before storage	12.8
Eleusine coracana (L.) Gaerten.	Finger millet (E), Rukweza (S)	Cereal	Seed is ground into powder and cooked into thick porridge. Seeds also pounded and fermented into traditional beer. Dried seed preserved by application of pesticides before storage	6.4
Oryza glaberrima Steud.	Rice (E), Mupunga (S)	Cereal	Shelled seeds cooked on their own or peanut butter is sometimes added. Shelled seeds preserved for later consumption	3.8
Abelmoschus esculentus (L.) Moench.	Okra (E), Derere (S)	Leafy vegetable	Young fruit cooked with soda into a slimy relish. Fruits sun dried for later consumption	2.6

Table 3. Details of the contribution of traditional food crops to household livelihoods in Nhema communal area, Midlands Province, Zimbabwe. Some respondents indicated more than one response.

Uses	Response (%), n = 78
Traditional food crops useful for family's food supply and nutrition	100
Traditional food crops reduce levels of poverty and inequalities	34.6
Traditional food crop production and incomes have declined due to perennial droughts	52.6
Traditional food crops sold on local markets supplement family's income	28.2
Traditional food crops exchanged with other goods and services	20.5
Few benefits derived from traditional food crops as the produced quantities are usually insufficient	11.5

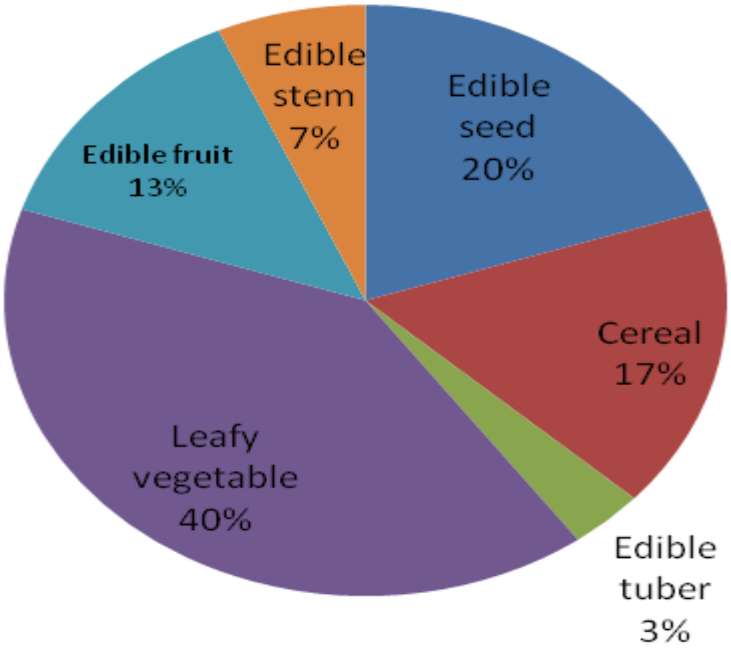

Figure 2. Food types of traditional food crops grown in Nhema communal area, Midlands Province, Zimbabwe.

towards reduction of poverty levels and food inequalities. A smaller proportion of the participants (11.5%) felt that the current level of traditional food crop production in Nhema communal area was insufficient to meet food security (Table 3). Although perceptions on the actual benefits derived from the cultivation of traditional food crops in Nhema communal area were variable among the participants (Table 3), there is no doubt that this category of food crops is important in meeting household food needs and food security (Table 2). These results correlate strongly with the findings of Bourdillon (1982), who found livelihoods of the majority of rural communities to revolve around the production of traditional food crops. However, 52.6% of the participants reported that their food production efforts and incomes derived from the sale of traditional food crops had declined due to perennial droughts.

According to 20.5% of the participants, traditional food crops were bartered with neighbours in exchange for other commodities, and were also given to neighbours and relatives. Interviews with participants revealed that this trade and exchange of traditional crop products between households and relatives strengthened house hold's social relationships. 28.2% of the participants sold traditional food crops on local markets to raise cash income (Tables 3 and 4). Interviews with participants revealed that the sale of traditional food crops and their products improved household's financial status, because cash income was used by the households to buy food, clothing and pay school fees.

Sales in local markets were often unreliable and poor. *Z. mays* (maize), *A. hypogea* (groundnut), *S. officinarum* (sugarcane), *O. glaberrima* (rice) and *I. batatas* (sweet potato) generated the most income for households (Table 4). The rest of the marketed traditional food crops generated less than$30.00 per annum.

Table 4. Mean cash income earned by households in Nhema communal area, Midlands Province, Zimbabwe.

Traditional crops sold	Income earned per traditional food crop			
	Daily ($)	Weekly ($)	Monthly ($)	Seasonally ($)
Cereals				
Oryza glaberrima (Rice)	-	-	-	39.4±8.7
Zea mays (Maize)	-	-	-	193.7±38.7
Edible fruits and seeds				
Citrullus lanatus (Watermelon)	-	-	-	23.1±5.6
Cucumis metuliferus (Spiny cucumber)	-	-	-	19.1±3.8
Edible stems				
Saccharum officinarum (Sugarcane)	-	-	-	33.3±5.6
Sorghum bicolour (Sorghum)	-	-	-	27.7±4.8
Edible tuber				
Ipomoea batatas (Sweet potato)	-	-	-	31.3±5.1
Leafy vegetables				
Brassica carinata (Covo)	2.9±0.3	5.4±0.9	21.1±0.9	
Brassica juncea (Tsunga)	2.1±0.2	4.7±1.1	22.3±1.1	
Brassica oleracea (Cabbage)	2.4±0.2	5.1±1.2	23.9±1.2	
Brassica rapa (Rape)	3.7±0.5	8.3±2.9	26.2±1.4	
Cleome gynandra (Spider flower)	-	-		22.7±0.7
Curcubita maxima (Pumpkin)	-	-		24.3±1.1
Lageneria siceraria (Gourd)	-	-		18.4±0.5
Lycopersicum esculentum (Tomato)	3.7±0.5	8.3±1.3	27.2±3.1	
Allium cepa (Onion)	2.8±0.2	6.4±1.4	21.7±3.2	
Pulses				
Arachis hypogea (Groundnut)	-	-	-	94.9±16.5
Vigna subterranean (Bambara groundnut)	-	-	-	23.1±3.9
Vigna unguiculata (Cowpea)	-	-	-	21.1±1.7

Apart from 13 (16.6%) participants employed in civil service and with income obtained from pensions (Table 1), the production and sale of traditional food crops represented the most important source of household income. Similar observations were made by Shackleton et al. (2008) who found that goods harvested from rural areas are consumed within the home, buffer households during times of stress and are bartered with neighbours or sold in local and regional markets. Twine et al. (2003) also found that rural communities in South Africa use natural resources for domestic purposes and to generate income.

According to participants, traditional food crops differ in times of planting and length of maturity period, enabling households to obtain food outputs in different times of the year. The majority of traditional food crops (60.9%) and their products are consumed throughout the year (Table 5). Traditional crops consumed during the dry season and pre-rainy season were: *Allium cepa, Arachis hypogea, Brassica carinata, juncea, oleracea,* and *rapa, Cleome gynandra, Eleusine coracana, I. batatas, Lycopersicum esculentum, O. glaberrima, Pennisetum glaucum, Saccharum officinarum, Sorghum bicolor, V. subterranean, V. unguiculata* and *Z. mays*. Food preservation was prevalent in Nhema communal area, resulting in extending shelf-life of traditional food crops.

According to participants, preserved food crops formed an important component of the food resources especially in winter when they were out of season and during drought periods. The preservation method, storage management and length of storage varied considerably. Principal modes of post-harvest preservation and treatment included sun drying, shelling and application of pesticides before storage (Table 2). *Citrullus lanatus, Cucumis anguria* and *Cucurbita maxima* fruits were stored for 1 to 3 months in shade without any treatment. Treated *E. coracana, P. glaucum, S. bicolor* and *Z. mays* seeds were stored up to a year or even longer periods making them available throughout the year to the majority of households (Table 5). 87.5% of the documented traditional food crops were preserved for future use, reducing post harvest losses of the produce. Shava et al. (2009) showed sun drying of traditional vegetables to be an important food preservation procedure, allowing rural communities to fill the food gap during periods of scarcity, particularly in the cold and dry winter season. According to Mnzava (1997), preservation of edible leaves is one of the strategies developed to help face times of food

Table 5. Availability of traditional food crops and their products in Nhema communal area, Midlands Province, Zimbabwe as derived from PRA exercises.

Species	Pre-rainy season	Rainy season	Harvest season	Dry season
Abelmoschus esculentus		√	√	
Allium cepa	√	√	√	√
Arachis hypogea	√	√	√	√
Brassica carinata	√	√	√	√
Brassica juncea	√	√	√	√
Brassica oleracea	√	√	√	√
Brassica rapa	√	√	√	√
Citrulluslanatus		√	√	
Cleome gynandra		√	√	√
Cucumis anguria		√	√	
Cucumis metuliferus		√	√	
Cucurbita maxima		√	√	
Eleusine coracana	√	√	√	√
Ipomoea batatas			√	√
Lageneria siceraria			√	
Lycopersicum esculentum	√	√	√	√
Oryza glaberrima	√	√	√	√
Pennisetum glaucum	√	√	√	√
Saccharum officinarum			√	√
Sorghum bicolor	√	√	√	√
Vigna subterranean	√	√	√	√
Vigna unguiculata	√	√	√	√
Zea mays	√	√	√	√

√, Available.

shortages.

Conclusion

The socio-demographic survey revealed that the majority of households in Nhema communal area depend on agriculture for their livelihoods. The households have developed a farming system characterized by cultivation of a wide range of traditional food crops. Food production is the major function of traditional food crops in Nhema communal area although crop surplus is marketed in local markets to raise cash income for the households. The results presented in this study indicate diverse plant species used for a variety of purposes. The central role of traditional food crops in the lives of households in Nhema communal area is unlikely to diminish in the near future. This leads to food security and sovereignty, resulting in poverty alleviation and reduction of food inequalities. The value of traditional food crops, therefore, needs to be appreciated by agriculturalists, government policy makers and scientists responsible for research, extension activities and agricultural policy. There is need to include traditional food crops in the agricultural development agenda as they have potential in enhancing food security.

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