

Grain and Vegetable Amaranth Adoption in Binga Rural District of Matabeleland North, Zimbabwe

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Abstract

This study seeks to popularise the traditional grain and vegetable aramanth crop in Manjolo and Sikalenge wards of Binga Rural District of Matabeleland North in Zimbabwe. The study of the grain and vegetable amaranth project by Ntengwe for Community Development (NCD) in collaboration with Tugwi Mukosi Multidisciplinary Research Institute (TMMRI) of the Midlands State University comprised of 74 farmers in the two wards aims at enhancing household nutrition, food and income security for the communities. Data for the study was collected by interviewing the aramanth farmers, 3 retail outlets (supermarkets) managers, 3 hoteland lodges managers, as well as 2 crop science specialists in April and May 2020. The SPSS version 24 was used to analyse the data. Findings from the study indicate that the communities were not aware of the food value of the but knew aramanth as an indigenous weed which grew on abandoned cattle pens and homesteads. Findings further indicate that the farmers have a positive perception towards the production and consumption of amaranth which can be exploited to create demand for the vegetable locally and beyond . Observed dynamics militating against commercial production of amaranth in the two wards include the poor transport delivery system, water shortages, costly farm inputs and information asymmetry on potential markets and suppliers. The study recommends further researches into amaranth productivity with regards to possibilities of value addition and beneficiation to tap international markets.

Key Terms: aramanth farmers, Binga District, farmers, food and nutrition security, value addition and beneficiation

Introduction

The study seeks to popularise the traditional grain and vegetable aramanth crop in Manjolo and Sikalenge wards of Binga Rural District of Matabeleland North in Zimbabwe. The study seeks to answer the following research questions; firstly, how can local resources such as the traditional aramanth crop

be utilised to enhance food and income security in an arid region such as Binga North? Secondly, how can the crop be popularised to the outside world so that it can be grown on a commercial scale in the two wards and lastly, how can the amaranth farmers can be linked to potential markets?

Amaranth (*Amaranthus* spp), *mowa* in Shona and *boonko/bongo* in Tonga is a species of the Amaranthaceae family, found mostly in subtropical and tropical regions of the world (Taylor and Emmambux, 2008; Corke et al., 2016). The plant originated (Svodziwa 2015) from the Aztec civilisation of Central America, where it was regarded as a religious crop. In Africa, the crop is gaining prominence because of its high nutritional content and easy-to-grow nature (Orona-Tamayo and Paredes- López, 2017). The crop is rich in high-quality protein and balanced amino acid (Venskutonis and Kraujalis, 2013; Orona-Tamayo and Paredes-López, 2017).

In sub-Saharan Africa, vegetable amaranth is consumed as a cooked green vegetable or used in soup (Corke *et al.*, 2016) providing a balanced nutrition to vulnerable populations. The grain is gluten free and contains high levels of Mg, Ca, Fe, and folate making it an important crop to supplement food products for children, or pregnant women (D'Amico and Schoenlechner, 2017; Kurt *et al.*, 2018). It is also important for people living with HIV or AIDS.

The majority of people living in Binga suffer from high levels of poverty (Cumanzala and Muleya, 2010; Mudimba, 2015). ZIMVAC (2019) concurs with this when it points out that over 75% of rural households in the district are nutrition and food insecure. According to ZIMVAC the stunting of children below the age of 5 years is 24 % while acute malnutrition is poor at 6.15 % (ibid). Poor crop yields in the district is caused by farmers' reliance on poor rainfall patterns, high temperatures, and poor soils. Food production by the local people is also constrained by an over-reliance on less productive traditional methods of farming. Average annual crop yields per household range from two to three 50 kilogram bags of millet, which is insufficient for household needs (Mwaramba et al. 2001; Ncube, 2016). Adoption of amaranth as a crop is likely to alleviate the problem of nutritional and food insecurity in the district.

Literature Review

Amaranth grows very rapidly especially under conditions of high temperatures, bright light, and dry soil thereby tolerating dry conditions. Its tolerance to climate change is particularly important for semi-arid areas. Sustainable climate proofing is what is needed to improve rural food production (Temidayo, 2011; Shumba et al., 2012; Brown et al., 2012; IPCC, 2012) as climatologists predict that there (Svodziwa, 2015) will be reduced productivity of crop-livestock systems in Zimbabwe (Chitongo, 2019; UNDP 2014). Crop diversification minimises the impacts of climate change and variability on food and nutrition value chains of resource-poor farmers (Paavola, 2008; Jiri *et al.*, 2015).

According to Svodziwa (2015) poorly developed markets and value chains have affected the adoption of many crops globally and Zimbabwe in particular. The horticulture marketing in Zimbabwe is divided into the lucrative high paying formal sector and the unstructured informal sector. The formal sector emphasizes quality and standards which are driven by the market, and it comprises supermarkets and hotels, and the export market. For export, farmers should also satisfy Good Agricultural Practice (Global GAP) Standards. The informal sector comprises city municipal markets, vendors, and farmer to farmer. The informal market is unstructured and farmers are faced with a moribund of challenges.

The Montpellier Panel (2013) points out that challenges to horticultural production in sub-Saharan Africa are unreliable power supplies, unavailability of formal credit, high interest rates, limited infrastructure, lack of market information, poor transportation, poor storage facilities, limited use of certified seeds and water shortages. In support of the above, Turner and Chivinge (1999) observe that smallholder horticulture producers typically have limited access to higher value formal markets in urban areas and are also completely unaware of the export market. They further point out that the market for horticulture produce is very unpredictable and dynamic, and without access to timely information, many farmers end up making huge losses. Tanyanyiwa and Bakasa (2018) assert that horticulture produce requires an efficient transport network, knowledge, and an adequate supply of inputs. Smallholder farmers tend to produce without any market research and then start to look for markets after harvesting (Thirtle et al., 2003). Odunfa (1995) warns that post-harvest and market losses in fruits and vegetables is a major concern. These are some of the issues being investigated following the adoption of the amaranth crop in Binga. For the adoption of amaranth and for communities to fully benefit from its production, the above market challenges must be addressed.

The study area

Binga District, in which the two wards are located, is situated about 430 km from Bulawayo and about 300 km from the resort town of Victoria Falls. The district has a poverty prevalence of 88.3% (UNDP 2015) compared to the Zimbabwe national average of 72% in the same year. In the district, food insecurity, malnutrition, environmental and climate change related hazards negatively affecting women, children, and youths (ZIMVAC, 2019). The area is characterized by highly erratic and low rainfalls (less than 450 mm/year) and poor soils predominantly the Kalahari sandy soils, which have failed to improve food and nutrition security when crops are planted.

Research methodology

This was a multi-stakeholder and multi-sectoral survey in that it included academics in the form of TMMRI, development practioners in the form of NCD, agricultural and extension officers as well as the potential market. The study integrated both qualitative and quantitative data which enabled triangulation, explanation, and contextualization of the findings. Data on the acceptability of the vegetable on the market was collected through interviews from 2 hotel and 2 large retail managers in

Bulawayo, Hwange, and Victoria Falls respectively. These respondents were purposively selected because they were deemed to be a potential market for the crop if it were to be produced on a commercial scale. From Ntengwe for Community Development the data collected focused on farmers' capacity and productivity. The agricultural and extension officers provided information relating to knowledge

In Binga District, 47 amaranth farmers and 27 residents in Manjolo and Sikalenge wards responded to a semi-structured interview guide. The respondents were purposively selected to participate in the study. No real names were used as respondent identifiers, rather codes were used to identify them. The data collected was analysed using the SPSS version 24 for frequencies, relationships, and correlations between the variables under investigation.

Results

The following were the results of the survey carried out to establish the adoption of amaranth by Binga households in Manjolo and Sikalenge wards of Binga district.

Land ownership

Households were asked to state the size of land they own for agricultural purposes and the data are presented in Table 1.

Table 1. Size of land owned by households in Manjolo and Sikalenge wards of Binga district

Size of land owned	Percent
1-5 acres	51.3
16-20	2.5
21-24	6.3
25 acres plus	40.0
Total	100

All the respondents indicated they customarily owned a piece of land on which they cultivated the crop and that they had access to cattle manure for the crop. However, this type of land ownership cannot be used as collateral for bank loans. This affects the credit worthiness of the households thereby, affecting their capacity to purchase inputs. Most households in the District drive their livelihood from peasant agriculture. They produce crops under low input rain fed systems, which are vulnerable to climate change and climate variability. Over fifty percent of the households owned from 1 to 5 acres of land, while 2.5 % owned between 16 and 20 acres. Over six percent (6.3%) owned between 21 and 24 acres with the rest (40%) owning 25 acres or more (Table 1). The size of land owned is big enough to apportion some space for amaranth production.

From agricultural extension officers, it was established that smallholder farmers produce vegetables during the offseason in gardens. During the farming season, farmers rely on indigenous vegetables that

grow like weeds in farmer's fields. Amaranth competes for space with exotic vegetables in the garden more than with agronomic crops in the field. However, most exotic vegetables grown like cabbage and rape are nutritionally poor compared to Amaranth. For full adoption of Amaranth, farmers need to expand their gardens or understand the opportunity cost of Amaranth production compared to exotic vegetables. Adoption is also affected by the availability of markets and income generated from the sale of the produce. If farmers make money from the production of Amaranth they will produce it. If farmers are also thought about the nutritional benefit of Amaranth they will produce and consume it.

Households opinion on the availability of inputs

More than thirty-seven percent (37,5%) of the respondents said the price, supply, and availability of inputs were good, 36.3% said is average and 26.3 said is fair (Figure 1). Zimbabwe has a wide distribution of agriculture inputs dealers; this explains why farmers were happy about the availability of inputs in shops. However, agricultural extension officers said most farmers do not buy the inputs because of costs. Most households in the area use retained seed and very few use fertilisers. They only use fertiliser if they get it from government input support programmes. The study revealed that even if they get the fertilisers, most of the farmers do not use this technology correctly. Soil testing and crop diversification are not practised by the farmers.

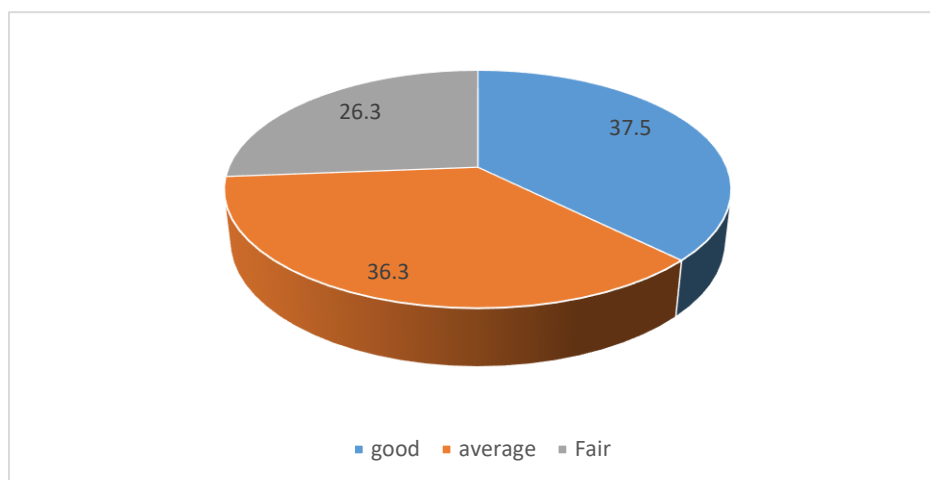


Figure 1. Household opinion on the price of inputs by retailers in Binga

Agro dealers who sell inputs said the current price of \$US30 per 50 kg bag of Compound D and ammonium nitrate fertiliser, and the united states dollar denominated price of pesticides were good considering that these items are imported. However, these shelf prices were beyond the reach of most smallholder farmers in the area. Amaranth crop also has the advantage of doing well under low inputs and harsh growing conditions, however, pest control is important. Research on the use of local herbs as insecticides is advised. Similar researches have been useful in Thailand and South Korea.

Types of horticultural produce consumed in the two wards

Table 2: Horticultural produce consumed in Sikalenge and Manjolo wards of Binga district

Type of produce	Percent
Exotic leafy vegetables like Covo (<i>Brassica oleracea var acephala</i>) rape <i>Brassica napus, variety napus</i>) tomatoes (<i>Solanum lycopersicum</i>) beans (<i>Phaseolus</i>), cabbages (<i>Brassica oleracea var. capitata</i>), <i>vulgaris</i>) etc.	96.9
Indigenous leafy vegetables- pumpkin leaves (<i>Cucurbita pepo</i>), <i>derere</i> (okra - <i>Abelmoschus esculentus</i>), grain and vegetable amaranth (<i>Amaranthus cruentus</i>), etc	3.1
Total	100

More than 96% of households consume exotic leafy vegetables like covo, cabbages and rape. These cultivars contain less micro-nutrients and proteins than Amaranth. Only 3.1% of the respondents indicated that they, apart from the exotic vegetables, also consumed indigenous leafy vegetables like pumpkin and cassava leaves as well as amaranth from a wide range of local varieties. It was also established that Amaranth is gradually being preferred because of its drought resistance and fast growth. The study also found out that consuming exotic vegetables was erroneously associated with modernity. This observation points to the need for a serious education on indigenous food and its nutritional significance to the locals.

Quantity of leaf vegetables required by households in Manjolo and Sikalenge wards of Binga district per day

Respondents were asked to state the bundles of leaf vegetables they require per family per day and results are presented in Table 2:

Table 2. Quantity of leaf vegetables consumed per day per household in Sikalenge and Manjolo wards of Binga

Amount of vegetables consumed per day	Percent
One Bundle	95
2 Bundles	2.4
3 Bundles	1.3
5 Bundles	1.3
Total	100

Households said they produced enough vegetables for family consumption. Ninety-five percent (95%) of the respondents indicated that they required one bundle of leaf vegetables. Although, the households live close to the Zambezi River, very few households could not afford fish. Prior to the adoption of

Amaranth, the communities reported that they relied much on vegetables such as rape, covo, and cabbage. Evidently, demographic health surveys indicate that wasting among children in the district is problematic because of the consumption of low protein diets. Production and consumption of protein rich amaranth can help supplement the protein deficiency. The study revealed a sturdy increase in the consumption of Amaranth.

Storage of horticultural produce in Sikangele and Manjolo wards of Binga

All the respondents indicated that storing their horticultural produce was a big problem hence a lot of loss through rotting. The traditional methods of preserving vegetables were drying and smoking. There is a need for diversifying preservation methods because not all consumers prefer dried vegetables. Amaranth can be a perennial crop which is consumed fresh throughout the year. A household must just have a few amaranth plants to feed the family throughout the year.

Access to information by the farmers

The major source of agricultural information in the area are government extension officers and non-governmental officers working in the area. However, because the farmers are widely spaced accessing all farmers timeously is a challenge. Farmers can have received agricultural extension services through mobile phones. Nonetheless, mobile cell phone reception in the wards is very poor due to a few base stations that were established in the area. Despite that problem, the majority of the respondents had cell phones. Of those having cell phones, only 10% had the android type and most of them had basic cell phones. The study noted that most households could not afford to buy airtime for their cell phones (Table 3). More than 97% of respondents use the phone for communication and not for research.

Table 3. Amount of money spend on airtime per day per household

Money spend on airtime per day (USD)	Percent
\$0-0.1	97.5
\$0.1 – 0.5	1.3
Above \$0.5	1.3
Total	100

Linkages to the markets

From the market linkages survey carried on large-scale retailers, lodges, and hotels in Bulawayo, Hwange, and Victoria Falls a few retailers indicated ignorance of the vegetable while some hotels in Victoria Falls said they knew about the vegetable. Supermarkets indicated they traded with registered companies which is a challenge when it comes to the fragmented resource poor Binga farmers, hence the need to organise these farmers and register them. Although the hotels and supermarkets may accept buying the vegetable from the farmers, they are located very far from the cities and towns. Most hotels

and supermarkets indicated that they contract farmers within a perimeter of 40 km to supply them with vegetables.

The study revealed that organically produced amaranth from poor farmers in Binga might get a niche market with tourist. Hotels in Victoria Falls said that they offered the amaranth dish to foreign tourists and is well preferred. However, they are importing the vegetable from South Africa. The hotels in Bulawayo which did not know the vegetable indicated their willingness to try it on their dishes or menus.

Conclusions

From the above findings the following conclusions can be drawn;

- The farmers have a positive perception towards the production and consumption of amaranth. This can be exploited by the farmers to create demand for the vegetable locally and beyond.
- There is a limited diversity of crops and sources of income for the farmers in the two wards. Diversity of crops gives nutritional resilience while wider income sources build resilience to extreme weather conditions such as droughts.
- There is need to organise farmers into groups to be able to produce enough for bigger clients like hotels and supermarkets. Given the perishability of the vegetable, local demand needs to be generated first while in the long run, possibilities of value addition and beneficiation are explored to tap international markets.

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