



Concealed Potential of Unconventional Crops: Smallholder Farmers' Involvement in Rosella (*Hibiscus Sabdariffa*) Production in Nala Ward, Dodoma Municipality

Emmanuel Ayo^{1}, Emmanuel Hauli² and Lilian Kihupi³*

Institute of Rural Development Planning, P.O.Box 138, Dodoma, Tanzania

*Corresponding Author: eayo@irdp.ac.tz

Abstract

The study was conducted in Nala Ward, Dodoma municipality. The aim was to assess smallholder farmers' involvement in Rosella production as a new strategy in household income improvement. Specifically, the study identified socio-economic factors influencing engagement of smallholder farmers in Rosella production and determining the farmers' awareness level on salient benefits resulting from Rosella crop. A sample of 98 households pioneered Rosella production in Nala Ward and four key informants were involved in this study. It was found that relative low production costs, assured harvest due to high drought tolerance and good revenue from Rosella sales, have motivated farmers to grow the unconventional crop. Lack of agro-extension services support connected to lack of market information and low technical knowledge on proper means of production and processing of Rosella may have negative effect on the adoption of the crop by smallholder farmers. Farmers are well aware of the lucrativeness of rosella, but scantily aware of the various valuable uses of rosella products when processed. The study therefore recommends that deliberate efforts should be made to assist farmers to grow rosella by availing them with technical support, market information and general facilitation towards successful harnessing the potentials of this crop.

Keywords: Rosella production, potential benefits, social economic factors, awareness level



1.0 Introduction

The economy of Tanzania depends largely on agriculture which contributes more than 50% of the Gross Domestic Product (GDP), and about 60% of foreign exchange earnings. It is estimated that, agriculture provides employment to over 80% of the national workforce and contributes about 75% of the foreign exchange earnings. The thrust of Agriculture policy is to enable farmers and livestock keepers to increase production in order to improve the living standard, nutrition and guarantee food security as well as increase national income (URT, 1997). Rosella is considered to be a tropical plant that grows annually, the crop originated in Egypt. Its original/ Arabic name is *Karkade*. There are many different varieties of Rosella seeds around the world, including India, Africa, Sudan, Jamaica, China, Philippines and the United States (Nooreliza, 2002).

Major cash (export) crops are subdivided into conventional and unconventional crops. Conventional crops are coffee, cotton, sisal, tea, cashew nuts, tobacco, pyrethrum and cloves. Unconventional export crops include a wide range of exportable products; most common are groundnuts, peas, wine grapes, sunflower, soybeans, castor oilseed, cardamoms, sesame, palm oil copra, cut flowers, fruits and vegetables (URT, 2006). Rosella is also an unconventional crop worldwide grown in Thailand, Mexico and China (Nooreliza, 2002). In Africa it is grown in Senegal, Mali, and Sudan, the world's best Rosella comes from the Sudan (Craven *et al.*, 2003). In Tanzania, the crop is grown in Dodoma, parts of Singida and Shinyanga regions.

The crop is used as beverage and additive in other foods, the fiber are used for cordage and as a substitute for jute (Duke, 1983). Main consumption areas of products are Germany and the United States as the main countries importing Rosella, and the demand is higher than the supply (Herman, 2002). The crop is known to thrive well in droughty condition and therefore may provide significant to ameliorate low household income in the dry zones where most of the known cash crops do not grow well (FAO, 2000).

Despite the fact that Rosella can thrive very well in Dodoma, and that international market is available, its production is still low. It is not clearly known whether rural agro-community entities particularly farmers are aware of the Rosella crop potentials especially in improving income at household level. It can be acknowledged that only few studies have been undertaken to help coming up with concrete strategies in promoting Rosella production. Therefore, the study was carried out assess the factors influencing Rosella production and community awareness on Rosella potentials.



2.0 Methodology

The study was conducted in Nala ward in Dodoma Municipality because is one of the areas where a relatively good number of households grow Rosella. Dodoma lies between 4⁰ to 7⁰ latitude south and 35⁰-37⁰ longitude East of Greenwich. Much of the region is a plateau rising gradually from up 830 meters above sea level. Nala ward is one of the western wards of the municipality with a total population of 5,359. Dodoma has a semi-arid type of climate which is characterized by a long dry season and a short single wet season. The long dry season experiences droughty winds and low humidity contributing to high evapo-transpiration, the hazardous conditions to crops. The average rainfall and temperature respectively are 570mm and 25⁰C, respectively. The major economic activities of the area among others are, crop and livestock husbandry. The conventional crops that are grown include sorghum, bulrush millets, cassava, maize, paddy, beans and oil-seeds (groundnut, simsim, sunflower and castor). Unconventional crops recently introduced are such as Rosella (*Hibiscus sabdariffa*) commonly known as *Choya* in Kiswahili and Moringa sub-trees (*Moringaoleivera*), in Kiswahili *Mlonge*. The area like the entire rural areas of the region depends mostly on subsistence arable farming and livestock production, practiced at household level. The agro-production is characterized by low productivity and production owing to low and erratic rainfall, high evapo-transpiration and low soil moisture holding capacity. .

The ward has household population of 760 households out of these about 120 are known to be involved in Rosella production, so it was reasonable to include all these in the study, but only 98 were available during data collection. Since this sample was over 80% of all target population it did not harm data validity. In achieving the study objectives, both primary and secondary data were collected. The primary data were collected by using semi-structured questionnaire to 98 household heads involved in Rosella production. Key informants respondents' involved Ward Executive Officer (WEO), Ward Agricultural Extension Officer (WAEO) and two Village Executive Officers (VEOs) of the two villages involved in Rosella production. Unstructured interview, checklist and side notebook were used to collect key information from a brief focus-group discussion in order to get more information concerning Rosella production. Relevant documents were reviewed to obtain secondary data. Data were edited and cleaned to ascertain legible recording. At the end of data collection, raw data were coded and entered to computer for descriptive analysis using Statistical Product for Social Solution (SPSS) software version 20. Results are presented in the following section.



3.0 Results and Discussion

3.1 Respondents' characteristics

Respondent's personal characteristics (age, sex, and level of education, marital status and occupation) are shown in Table 1, 2 and 3.

Table 1: Respondents' age by gender

Age (yrs)	Male		Female		Total	
	Freq	%	Freq	%	Freq	%
18-34	2	2.0	4	4.1	6	6.1
35-54	33	33.7	37	37.8	70	71.4
> 55	10	10.2	12	12.2	22	22.4
Total	45	45.9	53	54.1	98	100.0

Respondents were adult men and women aged between 20 and 55 years as shown in Table 1. Majority were between 35 and 54 years. This is the most active group likely to be found in any sort of production struggling to nurse families. Generally, all respondents were of age reliable to give sensible information. Age of respondents has a bearing on understanding about the production outcomes such as profit/benefits and loss/limitations, and may influence participation of people in production (Kiyingi, 1994). Gender refers not only to women or men *per se*, but to the socially defined roles of each sex, as well as to the relation between them. Gender issues, therefore, form part of the development approach that put people at the center and ensures their participation in the entire development process. Women constituted nearly 51.5% of the total population of Tanzania. In the current study women proportion was a bit higher than this, indicating a relative higher participation level of women in agro-production. Moreover, Tanzanian economy depends heavily on Agriculture and about 80% of the able bodied population is engaged in agriculture of which about 75% are women (EPAR, 2011).

Respondents' education level

Table 2 presents education levels for Rosella producers in the study area.

Table 2: Education level of the respondents

Level of education	Freq	%
Primary	77.0	77.6
Secondary	6.0	8.1
No formal education	14	14.3
Total	98	100



In order to realize an effective and high degree of production, income generation and overall social advancement, education level has a great part to play at the household level (Wambura, 2001). None of the sample respondents found to have education level above secondary school and those at secondary education are in small proportion. This indicates general low education level in the community, and less engagement of educated Tanzanians in agricultural-based activities.

Marital status of the respondents

The findings of the study show that married (78.6%) respondents are mostly involved in Rosella production compared to other groups (Table 3). This result concurs with Mtama (1997) who observed that those engaged in production especially agro-production are the ones matured, married who carry family care obligations.

Table 3: Marital status of the respondents

Marital	Frequency	Percent
Married	77	78.6
Divorced	3	3.1
Widow	4	4.1
Separate	3	3.1
Single	11	11.2
Total	98	100

Occupation of the respondents

The study being in the outskirts of the Dodoma municipality with almost all features of rural areas, all of the respondents involved were smallholder farmers depending almost entirely on agricultural activities for their livelihoods. This is obvious since agriculture is not just the employer of many Tanzanians, but also a crucial supporter of majority of low-income earners in rural and rural-like set ups (OECD, 2004). Agriculture provides food support to the agricultural-based and non-agricultural-based people. It also supplies raw materials for the processing industries for the production of various consumer and producer goods and is the main Tanzanian's foreign exchange earner (URT, 1982).

3.1 Socio economic factors influencing engagement of smallholder farmers in Rosella production

Relative cost of Rosella production

Level of production cost demanded by Rosella as compared to other crops was captured as per comments given by the respondent in Table 4. Majority (90) respondents



commented outright that cost required for Rosella production is relatively low. Some of the reasons given for the low cost were that: the crop can do well in soil of low fertility, succumb less to diseases and pests and compete fairly with weeds, properties which help to cut down cost of fertilizers, pesticides and weeding. The implication of this is that most farmers can afford to indulge in Rosella production as compared to the conventional crops.

Table 4: Views of Rosella producers on production cost relative to conventional crops

Cost	Respondents	Percentage
Low cost	90	91.8
Moderate	4	4.1
High cost	4	4.1
Total	98	100 %

Technical knowledge and Skills as software for Rosella production

The study revealed that lack of knowledge skills particularly on Rosella production is one of the bottlenecks in the production of this unconventional crop. Majority (79.6%) of the respondents claimed that they do not have enough knowledge and skills to run Rosella production commercially. One of the local leaders said: *"Farmers like Rosella very much but I know their knowledge in this crop is little compared to their knowledge in conventional crops"*. This is one of the likely reasons for failure in reaping the potential benefits of the crop and poor participation of other smallholder farmers in the production of the crop. This is exacerbated by the fact that majority of the community members have low level of education, which in a way may limit creativity and innovation adoption. This is supported by the fact that about 80% respondents (revealing the general situation) in the study area found to be primary school leavers who are likely to be slow adopter of new ideas and low creative capacity. This implies that there is low participation and adaptation of new technology and practices of Rosella production technicalities including market searching. However, the farmer or any person undergoes different stages before he/she adopts new idea. For example, one should require the information first followed by rising interest. Then he starts evaluating the new information Positive evaluation leads to trial and then adoption if perceived good and rejection if bad. If the farmer is forced to adopt a new practice without his own evaluation or willingness, there is a likelihood that it might not continue, but if he/she is motivated and convinced, the practice will be well taken (Herman, 2002).



Rosella market availability

A larger proportion (76.3%) of the respondents show concern that though Rosella has good price, its market availability is not as conducive as for the conventional cash and food crops. One of the respondents narrated that, *“Rosella is a very good crop, because no matter how little rains may be, one can manage to harvest something. The only problem is lack of buyers.”* This may be associated with the limited acreage of Rosella per household (just 0.5 – 1 acres) per household and the number of smallholders willing to grow Rosella. The amount produced does not raise alarm to buyers to go into the area; logically high production volume will invite buyers. Lack of market is also in one way associated with lack of processing for value addition and expanding demand scope by encouraging different consumers to consume diversified finished products from the crude product (Rosella calyces and/or fibres). The current study revealed that there is a problem of intermediaries in Rosella market. The intermediaries buy the crop at relatively exploitative low price and sell to other bulky buyers at higher profitable prices. This problem is facilitated by inaccessibility of market by farmers due to poor communication systems between rural to urban areas where the market is. Local market may offer additional opportunities for expansion through product diversification and better market linkages. In many ways, these markets are preferable for the small farmers as they are less volatile and represent a more even playing field and not for large farming in this study area (FAO, 2000).

Extension service as an input

The study shows that agro-extension service available is poorly accessed particularly on technical aspects of Rosella production. Seventy out of 98 respondents admitted to have received no or little advice from extension officers. One of the respondents said that: *“Extension officers do come for other agricultural issues and less on Rosella production.”* This implies that there is inadequate agro-extension services which is likely to affect the production; since farmers lack agricultural knowledge in terms of better seeds, control and management of pests and diseases, uses of better methods in cultivation, harvesting, processing and marketing. Sharma (2009) asserts that agriculture is a complex profession in the sense that it is an outcome of the efforts from different types of institutions including farmers. Introduction of new crop is developed by research institutions transferred to the farm community through agro-extension way. Agro-extension services involves offering advice, helping farmers to analyze problems and identify opportunities, sharing information, supporting group formation and facilitating collective action. Traditionally, agro-extension services were both financed and provided by the state. They aimed to deliver information and new technologies to farmers in order to raise and cope with changes in production. Many have failed to meet their objectives and, in some cases, it has been unclear whether they have had any impact at all (Nooreliza, 2002).



To deal with all factors influencing crop production discussed above, extension services, education, and culture and gender that will enhance bumper harvest needs efforts. Hayden (1980) talked about the technology used in African agricultural practices saying that "African agriculture is still overwhelmingly dependent on natural resources endowment, on human labor and relatively simple hand tools" The task is to ensure that agriculture is modernized. Therefore, farming involves a broad understanding of natural phenomenon and this is difficult to achieve without education or informed assistance.

Community awareness on the potential of Rosella benefits and uses

(i) Lucrativeness of Rosella towards income improvement

It was revealed that a smallholder farmer who dare to produce Rosella in the study area and secure market, can gain over Tshs. 500,000/= per acre (about 0.4ha) in a season (Table 5). According to the respondents, a kilogram of dry Rosella calyces fetches up to Tsh. 3,500/= and an acre produces about 150kg on average, given normal management. Household grows Rosella in an area between 0.5 - 1 acre. This is one of the cash crops in this area which contributes in improving income to household. Income earned improves standard of living by meeting expenses for education, health and food at family level. This implies that household income can be improved to cover the household needs given an improved production of Rosella. It throws light that if households harness the potential of this crop can improve income in this area and others termed semi-arid zone where most of the known-conventional cash crops do not perform well to give profitable returns as narrated by FAO (2000).

Table 5: Household Income earned from annually

Tanzanian shillings	Frequency
<150,000	10
150,000-300,000	34
>400,000	54
Total	98

Potential uses of Rosella and value chain

Knowledge of the community members on the potential uses of Rosella was captured as shown in Table 6 below. Majority (73.5%) know of selling raw product and local brewing as main uses of Rosella. On economic basis, this is sad information because Rosella can fetch higher returns if enters value chain process such as in making jams, jellies, sauces, wines, syrup, gelatine, refreshing beverages, pudding, cakes, ice-cream, sherbets, butter,



pies, tarts, and for making tea additive, and use of by-products such as the stems to produce fibres (Sharma, 2009). All these depend on knowledge and awareness of farmers on the potential uses. In the current study, it was noted that Rosella potentiality, is mainly due knowledge handicap among producers in the study area and probably in Dodoma and Tanzania at large. Producers essentially know and use Rosella for making local drinks such as juices and local beer and for medicinal remedy since it is blindly known to contribute in improving blood level of people with anaemic signs. This implies that lack of processing industries also limits the uses of the crop as compared to other countries that process this crop and generate different products from it. Strategies to help producers should include capacitating them to realize the real potential of the crop and introduce means of processing that will allow exhaustion of value addition. According to Duke (2008), in the West Indies and elsewhere in other tropical countries, the fleshy calyces are used fresh for making wine, jelly, syrup, gelatine, refreshing beverages, pudding, and cakes, and dried one is used for tea, jelly, marmalade, ices, ice-cream, sherbets, butter, pies, sauces, tarts, and other desserts, whereas stems and braches are good raw material for fibre production. Calyces are used in the West Indies to colour and flavour rum. Tender leaves and stalks are eaten as salad and as a pot-herb and are used for seasoning curries. Seeds have been used as an aphrodisiac coffee substitute. Fruits are edible and useful in treating arteriosclerosis and as an intestinal antiseptic (Perry, 1980 and Duke, 2008).

Table 6: Producers' knowledge on the potential uses of Rosella

Uses	Frequency
Local juice making	7
Medicinal purpose	19
Local brewing	35
Sale for cash income	37
Total	98

4.0 Conclusions and Recommendations

Rosella is one of the few crops, which can play a very significant role in household poverty alleviation especially in semi-arid rural areas of Tanzania. It has low production costs, thrives well in dry areas and has good profit. Challenges found to face Rosella producers included: lack of reliable market information, low technical knowledge and skills on many aspects of production exacerbated by limited provision of agro-extension services. Rosella producers are unaware of the crop potential uses and how profitable it is when subjected to value chain process to get different valuable products that can be exported. Currently, the producers know the income from raw rosella sales and local brewing, options just giving



low marginal benefits. Rosella is one of the few crops, which can play a very significant role in household poverty alleviation especially in semi-arid rural areas of Tanzania. The conventional crops commonly cultivated such as maize, sunflower, sorghum, groundnuts, simsim and millet, are frequently affected by drought, low soil fertility, diseases and pests and they are largely for local market.

We recommend that Government through Ministry of Agriculture and Food Security in collaboration with ministry of Industries and Trade has to promote Rosella production by formulating specific strategies such as the following ones: Sensitizing poor communities in semi-arid areas incorporate and expand Rosella production in their farming set ups. The crop is very appropriate in central dry areas of Dodoma, Singida and Tabora regions. This should be done by district/municipal councils through agro-extension service sections by networking with other agro-actors especially agro-research centres and the like. Major emphasis should be on local processing of Rosella to add value, fetch good price and increase market by touching diversified need of consumers. Nutrition officers sensitizing communities to use Rosella in the diets e.g. in form of juice, wine, herbal tea and medicine, since Rosella is one of natural medicinal foods against many health ailments. This will improve community health status, promote production and market motivation.



Reference

- Amatya, K.R., Bajracharya, P., Shakya, P.R., Chitrakar, B.R. and Tuladhar, P.M. (1995). *Medicinal and Aromatic Plants in Nepal Himalaya Problems*. Kathmandu, Nepal.
- Craven, L.A, Wilson, F.D and Fryxell, P.A. (2003). A taxonomic review of Hibiscus section Furcaria (Malvaceae) in Western Australia and the Northern Territory in [*Hort.purdue.edu*] site visited on 6/02/2010
- Dodoma Municipal Council. (2007). *Dodoma Urban District Profile*, Dodoma.
- Duke, A.J. (2008). *Duke's Handbook of Medicinal Plants of the Bible*, CRC Press, London.
- Herman, S. (2002a). *Improvement through conventional and mutation breeding*. Proc. Intern, Kuala Lumpur. Malaysia.
- Herman, S. (2002b). *A new crop in Malaysia*. Buletin PGM Dec 2002, p.13. Malvaceae family in [<http://www.fao.org/inpho/content/compand/text/ch28/ch28.htm>] site visited on 4/2/2010.
- Jalifah, A. L. (2008). *A promising mutant line for industry in Malaysia*. FAO Plant Breeding News, Edition 195. [<http://www.fao.org/ag/AGp/agpc/doc/services/pbn/pbn-195.htm>] site visited on 4/2/2010).
- Kiyingi, S.N and Lubwama, F. (1994). *Role of gender in Agricultural mechanization in Uganda*. A Paper Presented at the Workshop on Mechanization Strategy Formulation for Uganda.
- McCaleb, R. (2000). *Hibiscus Production Manual*. Herb Research Foundation. Boulder, Colorado.
- Michael, T. (1999). *The Human Adaptation for Culture* in Annual Review of Anthropology vol. 28: 514
- N.d (2009). Hibiscus Sabdarifa in [www.worldagroforestry.org] site visited on 27/5/2014
- Nooreliza, C. E. (2002). *Improvement through conventional and mutation breeding*. In: Proc. Intern. Nuclear Conf. 2002, 15-18 Oct 2002, Kuala Lumpur. 19 pp. [<http://mason.gmu.edu/~gkarman/projects/plant/plant.htm>] site visited on 4/2/2010
- OECD (2004). *Promoting Entrepreneurship and Innovative SMEs in a Global Economy: Towards a More Responsible and Inclusive Globalisation* in [<http://www.oecd-instabul/sme2004.org>] site visited on 27/5/2014



- Sharma, K. C. (2009). *Crop Diversification Project, Ministry of Agriculture, Kathmandu, Nepal.*
- Sharma, P. (1995). Non-wood forest products and integrated mountain development: Observations from Nepal. In, Report of the International Expert Consultation on Non-Wood Forest Products, FAO Rome. Pp.157-166.
- Suhaila, M. (2002). *Antioxidative properties of (Hibiscus sabdariffa L.) in linoleic acid model system. Nutrition & Food Science 32(1): 17-20.*
- Tsui, H. T. (2000). *Protective effect of Hibiscus anthocyanins against tert-butylhydroperoxide-induced hepatic toxicity in rats. Food and Chemical Toxicology, 38: 411-416.*
- URT (1997). *United Republic of Tanzania, Tanzania Agriculture and Livestock Development Policy.*
- URT (2006). *Country Profile of the United Republic of Tanzania (Agricultural Trade) Directorate International Trade: Africa Desk Department of Agriculture, Pretoria.*
- Vaidya, K. R. (2000). *Natural cross-pollination in, Hibiscus sabdariffa (Malvaceae). Genetics and Molecular Biology, 23(3): 667-669.*
- World Bank, (2001). *Agricultural Extension Lesson and Practices No.6*