

Assemblage of Roselle (*Hibiscus sabdariffa* L.) Land races in Niger State, North Central Nigeria

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Abstract

Hibiscus sabdariffa L.) landraces from Niger State, North Central Nigeria, were collected from all the major roselle producing areas of the state. The survey covered twenty six (26) villages in fifteen (15) Local Government Areas (LGAs). The landraces were collected from the three agricultural zones (i.e. Zone A, B and C). Forty-two (42) Farmers were interviewed and twenty-six (26) accessions were collected. The number (percentage) of landraces collected from the areas visited included. Wushishi 2(7.4%) Paiko 2(7.4%) Mokwa 2(7.4%) Rafi 3(11.1%) Lavun 3(11.1%) and Bosso 4(14.8%) The highest number of landraces collected was from Bosso 4 (14.8%); this was followed by Rafi and Lavun LGAs, with 3 (11.1%) landraces each. Findings from this study suggest that these Local Government Areas might be the secondary centre of diversity of the crop in Niger State. It was also clear that 57.1 % of the farmers interviewed have been growing this plant for over ten years whereas, only 14.3 % of the farmers have been cultivating the plants for less than five years. There was variation among the land races collected in terms of their calyxes colours; the respective percentage of landraces with red or deep red calyxes and green calyxes are 64.3 % and 35.7 %. Farmers' interests tend to influence the preference of the different roselle types; where some prefer the leafy vegetable, some other prefer the calyxes. The range of values of the seed diameters is between 3.3 and 3.7. This study therefore suggested that Niger State of Nigeria is endowed with numerous landraces of Roselle, and thus could serve as secondary centre of origin of the crop. It is therefore recommended that, morphological evaluation of these landraces should be done, to reveal their acclaimed heterogeneity.

Keywords: Agricultural zones, Centre of origin, Landraces, Variation, Heterogeneity

1.0 Introduction

Hibiscus sabdariffa L. is a flowering genus *Hibiscus* (Hutchinson and Dalziel, 1958; Heywood, 1978; Olubukola and Spermatophyta, subdivision Illoh, 1996). The genus consists of about 300 species, some of which are *H.*

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sabdariffa, *H. cannabinus*, *H. tiliaceus*, *H. strattensis*, *H. acetosella*, *H. physaloides*, *H. lunariifolius* and *H. scotellii*. In Nigeria the most commonly cultivated species is *Hibiscus sabdariffa* also known as Roselle. The plant is believed to have originated from India but now widely cultivated throughout the tropical world for its Calyxes, leaves and Fibre.

The plant is an annual herbaceous shrubs cultivated for its calyces although leaves and seeds have been used in traditional medicine (Mahadevan *et al.*, 2009; Anjah *et al.*, 2012). The plant is about 3.5 m tall and has a deep penetrating tap root. It has smooth or nearly smooth, cylindrical dark green to red stems. The leaves are alternate, 7.5 - 12.5 cm long, green with reddish veins and long or short petioles. The fruit is a velvety capsule, 2-5cm long, which is green when immature, 5-valved, with each valve containing 3-4 seeds which usually contain high percentage of oil (Rice *et al.*, 1993). The capsule turns brown and splits open when mature and dry. Seeds are kidney-shaped, light-brown, 3-5mm long and covered with minute, stout and stellate hairs. There are three common varieties grown in Nigeria, two red and a green variety (Udom *et al.*, 2001). The green variety is more predominant in the Southern parts of the country where it is used as a vegetable in making traditional soups. The two red varieties on the other hand are predominant in the Northern parts of Nigeria where they are used in making a

popular beverage drink called "Zoborodo" (Daudu *et al.*, 2015). Roselle can also be used as fiber crop, refreshing beverage and also leafy vegetable. The red calyces surrounding the fruits are used to brew non-alcoholic drinks and as a coloring agent for Jelly, Jam, beverages and foods. It is believed to also reduce cholesterol level in blood as reported by (Anonymous, 2012). The leaves of roselle can be eaten as a vegetable while the seeds are used as feed meal for fish and Domestic animals. (Mukhtar, 2007). Schippers (2000) observed that roselle is now considered one of the most competitive beverages in the world.

In terms of Nutritional value, roselle has been found to be a very good source of protein (Mukhtar, 2007). The plant has also been reported to have antihypertensive, hepatoprotective, antihyperlipidemic, anticancer and antioxidant properties. (Diane *et al.*, 2010). The fresh calyces are also rich in riboflavin, ascorbic acid, niacin, carotene, calcium, and iron that are nutritionally important (Mahadevan *et al.*, 2009) as well as amino acids and mineral salts (Falusi *et al.*, 2014).

Many uses to which roselle has been put and its high nutritional value requires that more research be done on the crop, especially in to conserving the crop genetic resources in Niger State, Nigeria. Plant genetic resources will, undoubtedly, provide valuable traits for the plant breeders needed for crop improvement. This is very timely at a time where plant genetic resources is

threatened by "genetic erosion". Old varieties in farmers' fields are replaced by newer ones and often times the genes found in the farmers varieties are not all contained in the modern varieties. This study was therefore designed to collect and conserve the seeds of the different roselle landraces grown by local farmers in Niger State of Nigeria.

2.0 Materials and Methods

2.1 Description of the Study Area

Niger State is located in the North Central part of Nigeria between Latitude 8°22'N and 11°30'N and Longitude 3°30'E and 7°20'E. This region falls within the Guinea Savanna vegetation Zone. The State is bordered to the North by Zamfara State, to the Northwest by Kebbi State, to the south by Kogi State, to southwest by Kwara State, while Kaduna State and Federal Capital territory border the state to northeast and southeast respectively (Niger State MAAH Bulletin, 2008). Furthermore, the State shares a common international boundary with the Republic of Benin at Babanna in Borgu Local Government area of the state. Currently the state covers a total land area of 74,244 sq.km, or about 8% of Nigeria's total land area. Temperatures are generally high between 26 °C and 35 °C with little variations throughout the year. There are two distinct seasons, the rainy season and the dry season.

2.2 Collection of Roselle Accessions

A survey of growers of Roselle was conducted in three Agricultural zones of Niger State; which include Zone A, Zone B and Zone C Agricultural zones of the state between October and December when the farmers were harvesting their crops. The local Governments visited were Bida, lavun, Edati, Katcha and Mokwa in Zone A; places visited in Zone B were Paiko, Sarkin Pawa, Bosso and Kuta while Wushishi, Rafi, Magama and Kotangora were visited in Zone C. Seeds were collected, packed and sealed in thick paper envelopes each of which was given a collecting code, local name, and locality. They were finally stored in dry containers and were taken to Department of Biological sciences Federal university of Technology, Minna, for conservation and future utilization. The diameter of the seeds collected were determine using micrometer screw gauge.

A participatory rural Appraisal method was adopted in the survey where Questionnaires were administered to roselle farmers and samples of available Roselle accessions under husbandry were collected. The questions asked included local name of accessions, source of seed supply, yield position in farming system, roselle seed preferences, constraints to cultivation and economic importance.

3.0 Results and Discussion

The survey covered 26 villages in 15 Local Government Areas of Niger State. Forty two farmers were interviewed and twenty six accessions were collected (Table 1). Collections from Washish, Paiko, Bosso, Mokwa and Rafi local government revealed that many accessions were replicated over local government areas in Niger State. The local Governments that recorded the highest number of accessions of *H. sabdariffa* accessions were Bosso 4 (14.8 %) followed by Rafi and Lavun local governments 3 (11.1%).

Many different accessions of roselle found in different local Governments in Niger State indicates high genetic diversity of *H. sabdariffa* in the State and that Niger state has a great diversity of this crop. This is similar to the work of Falusi, (2004) who said that Kaduna and Niger State had the highest number of roselle accessions in Nigeria. The number of accessions obtained in Niger State indicates that Niger State might be a major centre of roselle production in Nigeria. This can be supported by the report of Mohammed *et al.* (2011); Daudu *et al.* (2015), who said that the genus *Hibiscus* has its centre of origin to be West Africa. The various calyxes colours encountered were green, red, light red, and deep red which is inline with the findings of Falusi *et al.* (2014). There was a distinct variation in the seed diameters of the various

landraces; the range of values being 3.3-3.7. This variation might be due to genetic constituent of the landraces or even environmental factors. This range of seed diameters fall within the range of value described by Daudu *et al.* (2015).

The results showed that 57.1 % of the farmers have been growing the crop consistently for over ten years, 28.6 % have been cultivating the plants between six to 9 years, while only 14 % have been growing the plants for not more than five years. This shows that majority of the farmers are quite acquainted with the land races and by now the roselle would have been completely adapted to the conditions of those areas. In addition, it is quite possible that these landraces have been transferred from one generation of the farmers to another, showing that Niger State could serve as Secondary centre of origin of the crop. This further corroborated the opinion of Mohammed *et al.* (2011) on the centre of origin of roselle.

The information on sources of seeds supply by the farmers were distinctly divided into two groups; 71.4 % of the farmers obtained their seeds from fellow farmers who have owned these seeds for many years and have been planting them yearly. Only 28 % of the farmers agreed to have purchased the seeds from seed markets. This clearly showed that the greatest repository of the seeds of these landraces are from the farmers.

...the fact that the cost of the farmers...
...the variety are used in preparing...
...the green calyx type...
...the farmers often grow...
...the red and deep red type...
...the majority of roselle...
...the red or deep red calyxes...
...this corroborates the findings.

All the farmers interviewed allowed
the roselle with red calyxes to thrive in
their farms without application of
fertilisers, this has never hampered the
performance of these crops. However,
organic manures are added to the green
types, thus, indicating the hardiness
and tolerance of the red-deep-red
calyxes types to relatively poor soil
conditions. This observation
concurred with that of Stevels (1990)
who said that roselle plants with
anthocyanin pigments (i.e. red and
deep red types) can withstand harsh
environmental conditions and are
more tolerant than the green types.
Hence, they are more common in the
Savannah regions of Nigeria.

More than 50% of the farmers
preferred roselle variety with dark red
calyx because they believe it is more
productive and has a lot of medicinal

values. It is widely used in preparation
of food and drinks. This variety is
grown in commercial quantity in
Borno, Kaduna and Yobe local
government. This is in conformity with
the report of Stevels (1990) who
reported that roselle plants with
anthocyanin pigmentation are able to
withstand harsh environment and they
are also more drought tolerant than
green types. Hence they are common
in dry zones of the State. This report
also agreed with the work of Fataless
et al (2010) that production of *H.
sahelensis* is mainly in the Guinea and
Sudan savannah zones of the country
where the red calyx genotype are
prevalent and green calyx variety is
mainly found in the south western part
of the country where the leaves and
green calyx are eaten as vegetables
while the seeds are used as feed-tilth
for domestic animals (Mukhtar,
2007). The farmers in the south-
western part of Niger state gave more
priority to their green variety of
roselle. Many of them responded that
they normally grow the green varieties
for vegetable, hence there is need to
retain the diversity of the indigenous
land races of the crop. The
morphological and molecular
characterization of the materials
collected is therefore necessary to
ascertain the genetic diversity existing
within the species in Niger state.

In conclusion, Niger State of Nigeria is
endowed with numerous landraces of
Roselle, and thus could serve as

secondary centre of origin of the crop. Findings from this study has provided insight into the different roselle landraces grown in the State. In addition, the different landraces of *H. sabdariffa* seeds collected and conserved in Federal University of Technology Minna, can serve as a genetic material for future utilization and improvement of the crop. It is therefore recommended that morphological evaluation of these

landraces should be done, to reveal their proclaimed heterogeneity.

4.0 Acknowledgments

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Table 1. Description and location of Specific Locations in "Raya" ...

No	Accession Number	Local Name	Location	Category	Length (meters)
1	NG001	Empang	Empang Laut	Green	1.1
2	NG002	Empang	Empang Laut	Green	1.5
3	NG003	Empang	Yakawa	Green	1.8
4	NG004	Empang Laut	Yakawa	Red	1.9
5	NG005	Empang	Empang Laut	Green	2.1
6	NG006	Empang Laut	Empang Laut	Red	2.2
7	NG007	Empang	Empang Laut	Green	2.5
8	NG008	Empang	Empang Laut	Green	2.9
9	NG009	Empang	Empang Laut	Red	3.0
10	NG010	Empang	Empang Laut	Green	3.5
11	NG011	Empang	Empang Laut	Red	3.8
12	NG012	Empang	Empang Laut	Green	4.0
13	NG013	Empang	Empang Laut	Green	4.5
14	NG014	Empang	Empang Laut	Red	4.8
15	NG015	Empang	Empang Laut	Red	5.0
16	NG016	Empang	Empang Laut	Green	5.5
17	NG017	Empang	Empang Laut	Green	6.0
18	NG018	Empang	Empang Laut	Red	6.5
19	NG019	Empang	Empang Laut	Red	7.0
20	NG020	Empang	Empang Laut	Green	7.5
21	NG021	Empang	Empang Laut	Red	8.0
22	NG022	Empang	Empang Laut	Red	8.5
23	NG023	Empang	Empang Laut	Green	9.0
24	NG024	Empang	Empang Laut	Green	9.5
25	NG025	Empang	Empang Laut	Green	10.0
26	NG026	Empang	Empang Laut	Green	10.5

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