DISTRIBUTION AND DIVERSITY OF COWPEA GERMPLASM IN NIGER STATE

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ABSTRACT: Biodiversity loss have emerged as bottleneck befalling the agricultural production including cowpea. Rising insecurities, socio-economic changes, abnormal onset and cessation of rainfall and soil conditions has led to a dramatic reduction of cowpea landraces cultivated recently and probably to the disappearance of local populations. Germplasm exploration is the basis for crop improvement and foundation of agricultural production. This study was designed to evaluate the distribution and diversity of cowpea germplasm using seeds morphology. The study was conducted between the months of November to December 2021. A total of 43 germplasm was collected. The germplasms were randomly collected across the three Geopolitical zones of Niger state. The data was collected using participatory research tools and techniques such as direct observation, group discussions, individual interviews, field visits and questionnaires. The results revealed that *Vigna unguiculata. Vigna unguiculata* recorded the highest accessions (39), followed by *Vigna angularis* (1), *Vigna mungo* (2), *Vigna radiata* (1). *Vigna unguiculata* showed the highest occurrence in most parts of the three geopolitical zones while *Vigna angularis* and *Vigna radiata* were found in Zone A), *Vigna mungo* were found in Zone A and zone B. Zone A had the highest germplasm accessions (22), zone C (13). Zone B (8). This result showed an uneven distribution of the species of cowpea and this could be as a result of the increasing insecurity ravaging some parts of the state. There by promoting the movement of the farmers from one area to another. Hence germplasm collection can serve as means of conserving crop diversities from total loss.

Keywords: cowpea, food security, genetic diversity, germplasm

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INTRODUCTION

Cowpea (*Vigna unguiculata* L. Walp.) (2n = 2x =22) belongs to the family Fabaceae and is a warm annual crop that is adapted to drier regions of the tropics (Agbogidi, 2010). Cowpea is mainly consumed as dry grain or fresh vegetable. The grain contains high protein, carbohydrate, vitamins, and fibre (Hall, 2012). Boukar *et al.* (2019), revealed that the protein content of cowpea is about 250 mg/g, which is comparable to soybeans. Boukar *et al.* (2016), reported that Nigeria is the largest producer of cowpea worldwide followed by Niger, Burkina Faso, Cameroon, and Mali. The North West and North East regions of Nigeria such as Borno, Bauchi, Gombe, Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara States are the most productive, accounting for 75% of the cowpea production in Nigeria (Manda *et al.,* 2019). Niger state has high diversity of cowpea however, it has not been collected and assessed extensively thus leading to the disappearance of many varieties, as earlier reported by Gbaguidi *et al.,* 2013).

Socio-economic changes and drought however, has led to a dramatic reduction of cowpea landraces cultivated recently and probably to the disappearance of local populations (African Centre for Biodiversity, 2015). Similarly, the current insecurities in Nigeria have been identified by Aluko *et al.* (2016) as a major factor behind the reduction in cowpea production. Germplasms are living genetic resources that are maintained for animal and plant breeding, preservation, and other research uses. Gado *et al.* (2019), opined that germplasm collections ranges from collections of wild species to elite, domesticated breeding lines that have undergone extensive human selection. Germplasm collection plays a critical role in supporting conservation and crop genetic enhancement strategies. It is important for the maintenance of biological diversity and food security. Genetic diversity of crops plays an important role in sustainable development and food security, as it serves as a source of genes needed in the development of better performing and well adapted varieties (Dossa *et al.,* 2016).

The aim of this study was to evaluate the distribution and diversity of cowpea germplasm in the geopolitical zones of Niger state using seeds morphological traits of varieties.

MATERIALS AND METHODS

The germplasm collection was done following the methods described by Kombo *et al.* (2012) and Gado *et al.* (2019). The germplasms were collected between the months of November to December 2021 across the growing local government in the three Geopolitical zones of Niger state. The data were collected through participatory research tools and techniques such as direct observation, group discussions, individual interviews and field visits using a questionnaire. The varieties available with the producers were collected in paper bags and labelled following the methods of Gado *et al.* (2019). The germplasms were characterise using standard descriptors developed by the International Board for Plant Genetic Resource IBPGR1 (1983).

RESULTS AND DISCUSSION

A total of 43 accessions of the genus *Vigna* and four species; *unguiculata, angularis, mungo, radiate* where collected. After the sorting, *V. unguiculata* recorded the highest accessions (39), *V. angularis* (1), *V. mungo* (2), *V. radiata* (1) (Table 1, Figure 1). The specie *V. unguiculata* showed the highest occurrence in most parts of the three geopolitical zones while *V. angularis* and *V. radiata* were found in Bida (Zone A), *V. mungo* was found in Bosso (Zone B) and Bida (Zone A). Mokwa and Bida (Zone A) had the highest number of accessions 22, Kontagora and Wushishi (Zone C) 13, Shiroro and Bosso (Zone B) 8. These findings entails that there was uneven distribution of the species of cowpea across the geopolitical zones of Niger state.

The un-uniform distribution and confinement of some species to one particular area or zone of the state could be attributed to the varying availability of rainfall or other edaphic conditions. This can be corroborated by the findings of Adojutelegan *et al.* (2015) who highlighted that rainfall and soil conditions among others limit production of watermelon. According to Oyinloye *et al.* (2018), the outcomes of climate change has led to the disruption in the seasonal pattern of food production and distribution. The low occurrence of *V. unguiculata* in zone C and parts of zone B could be attributed to the rising insecurities which has crippled farming activities in the zones. This is supported by the findings of Aluko *et al.* (2016), who reported that increasing insecurities spread in parts of country could limit the production of cowpea. Similarly, Agri *et al.* (2019), mentioned that the escalation of insurgency and other forms of conflicts has caused many farmers to abandon their farms thus affecting the production and diversity of cowpea in Nigeria.

The occurrence of *V. ungiculata* across the zones might be linked to in and out flow of germplasms in the regions which could be facilitated by Agricultural Development Projects (ADPs) as reported by Gado *et al.* (2019). Similarly, Mahesh and Ronnie (2017), reported that one of the routes through which germplasms get in to the region is by donor-assisted projects involved in agricultural development.

Conclusion

Niger state houses substantial diversity of cowpea *Vigna unguiculata* is of outmost importance to the economy and the livelihood of the farmers and the populace. The *V. unguiculata* showed the highest occurrence in most parts of the three geopolitical zones while *V. angularis* and *V. radiata* was found in Bida (Zone A), *V. mungo* were found in Bida and Bosso (Zone A and B).

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Figure 1. Seed morphology of cowpea species in Niger State

Table 1. Sources and description of cowpea in Niger State

Accession	Local name	Scientific name	Coat colour	Hilum colour	Shape	Length (cm)	Diameter (mm)	Location	L.G	Zone
NGA-BD-01	Kapangi	*V. unguiculata*	Cream white	Yellow	Rhomboid	0.8	5	Edokota	Bida	NA
NGA-BD-02	Ezo miliki	*V. unguiculata*	Cream	White	Kidney	1.0	7	Bida	Bida	NA
NGA-BD-03	Kapangi	*V. unguiculata*	Cream white	Black	Globose	0.5	4	Batati	Bida	NA
NGA-BD-04	Ezo sobo	*V. unguiculata*	Brown	White	Rhomboid	0.9	5	Bida	Bida	NA
NGA-BD-05	Bossa	*V. unguiculata*	White	Black	Ovoid	1.3	7	Bida	Bida	NA
-NGA-BD-06	Egwakangi	*V. angularis*	Red	White	Rhomboid	0.6	4	Kutigi	Bida	NA
NGA-BD-07	Dan misra	*V. unguiculata*	White	White	Rhomboid	1.2	7	Bida	Bida	NA
NGA-BD-08	Kapangi	*V. unguiculata*	White	Yellow	Kidney	0.9	5	Bida	Bida	NA
NGA-BD-09	Kapangi	*V. unguiculata*	Cream white	Black	Kidney	0.8	4	Kangi Bororo	Bida	NA
NGA-BD-10	Kebbiwhite	*V. unguiculata*	Cream white	Brown	Ovoid	0.9	5	Bida	Bida	NA
NGA-MK-11	Ezo sobo	*V. unguiculata*	Neples yellow	White	Kidney	1.3	7	Kudu	Mokwa	NA
NGA-MK-12	Ezo sobo	*V. unguiculata*	Light brown	White	Rhomboid	1.2	4	Kudu	Mokwa	NA
NGA-MK-13	Ezo sobo	*V. unguiculata*	Golden yellow	White	Rhomboid	1.0	5	Ibbah	Mokwa	NA
NGA-MK-14	Ezo milki	*V. unguiculata*	Cream	White	Ovoid	1.0	4	Mokwa	Mokwa	NA
NGA-MK-15	Ezo miliky	*V. unguiculata*	Cream	White	Rhomboid	0.9	6	Kudu	Mokwa	NA
NGA-MK-16	Ezo sobo	*V. unguiculata*	Golden brown	White	Rhomboid	1.3	6	Ibbah	Mokwa	NA
NGA-MK-17	Ezo kenchi	*V. unguiculata*	White	Brown	Ovoid	1.1	6	Kudu	Mokwa	NA
NGC-KT-18	Waken milk	*V. unguiculata*	Cream	White	Rhomboid	1.0	6	Kontagora	Kontagora	NC
NGC-KT-19	Danmarkinsoja	*V. unguiculata*	Black &White	White	Rhomboid	1.0	4	Kontagora	Kontagora	NC
NGC-KT-20	Waken sobo	*V. unguiculata*	Bright yellow	White	Rhomboid	1.0	6	Kontagora	Kontagora	NC
NGC-KT-21	Waken sobo	*V. unguiculata*	Yellow	White	Kidney	1.3	5	Kontagora	Kontagora	NC
NGC-KT-22	Kananado	*V. unguiculata*	White	Brown	Ovoid	1.0	6	Kontagora	Kontagora	NC
NGC-KT-23	Dan misra	*V. unguiculata*	White	White	Rhomboid	1.0	4	Kontagora	Kontagora	NC
NGC-ZG-24	Olanyo	*V. unguiculata*	Yellow	White	Rhomboid	1.3	5	Zungeru	Wushishi	NC
NGC-ZG-25	Kananado	*V. unguiculata*	White	Brown	Rhomboid	1.1	5	Zungeru	Wushishi	NC
NGC-ZG-26	Iron beans	*V. unguiculata*	White	Black	Rhomboid	1.2	4	Zungeru	Wushishi	NC
NGC-ZG-27	Waken sobo	*V. unguiculata*	Raw sienna	White	Rhomboid	1.3	7	Zungeru	Wushishi	NC
NGC-ZG-28	Dan muzakari	*V. unguiculata*	Cream white	White	Ovoid	1.1	5	Zungeru	Wushishi	NC
NGC-ZG-29	Dan misra	*V. unguiculata*	White	White	Rhomboid	1.0	7	Zungeru	Wushishi	NC
NGC-ZG-30	Waken milk	*V. unguiculata*	Cream	White	Rhomboid	1.0	6	Zungeru	Wushishi	NC
NGB-SH-31	Kananado	*V. unguiculata*	White	White	Rhomboid	0.9	4	Mutun daya	Shiroro	NB
NGB-SH-32	Kananado maidoro	*V. unguiculata*	White	Brown	Kidney	1.3	5	Gwada	Shiroro	NB
NGB-SH-33	Waken gwari	*V. unguiculata*	White	Black	Ovoid	0.8	4	Kuta	Shiroro	NB
NGB-SH-34	Kananado	*V. unguiculata*	White	Brown	Rhomboid	0.7	5	Kuta	Shiroro	NB
NGB-BS-35	Waken gwari	*V. unguiculata*	White	Black	Rhomboid	1.3	7	Minna	Bosso	NB
NGB-BS-36	Zappa	*V. unguiculata*	White	White	Rhomboid	L.2	5	Minna	Bosso	NB
NGB-BS-37	Dan misra	*V. unguiculata*	White	White	Rhomboid	1.0	7	Minna	Bosso	NB
NGB-BS-38	Achishiru	*V. mungo*	Black	White	Ovoid	0.6	4	Maikunkele	Bosso	NB
NGA-BD-39	Ezo yere	*V. unguiculata*		White	Rhomboid	1.0	6	Sachi	Bida	NA
NGA-BD-40	EzoK ampala	*V. unguiculata*	White & brown		Ovoid	0.9	5	Barak	Bida	NA
NGA-BD-41	Asuwayin	*V. radiata*	Green	White	Ovoid	0.6	5	Ndawangwa	Bida	NA
NGA-BD-42	Egwakangi	*V. mungo*	Black	black	Ovoid	0.7	6	Gbazhi	Bida	NA
NGA-BD-43	Fenzo	*V.unguiculata*	Brown	white	Rhomboid	0.9	7	Gbazhi	Bida	NA

NGC – KT – 23 Dan Misra (*Vigna unguiculata*)

NGC – ZG-24 Olanyo (*Vigna unguiculata*)

NGB – ZG-35 Waken gwazi (*Vigna unguiculata*)

NGB –BS – 38 Achishiru (*Vigna mungo*)

NGB – BS – 36 Zappa (*Vigna unguiculata*)

NGA –BD-39 Ezo Yere (*Vigna unguiculata*)

NGA –BD-40 Ezo Langba (*Vigna unguiculata*)

NGA –BD – 41 Asunwayin (*Vigna radiate*)

NGA- BD -42 Egwakangi Kin (*Vigna mungo*)

NGA-BD-43 Fenzo (*Vigna unguiculata*)

Figure 1. Contd.