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Phenotypic diversity of accessions of *Gurunsi* eggplant (*Solanum macrocarpon* L.) from Burkina Faso

KABORE B.*, TRAORE R.E., KIEBRE Z., SAWADOGO B., KIEBRE M., NANEMA K. R., SAWADOGO M., BATIONO/KANDO P.

Laboratoire Biosciences, Unité de Formation et de Recherche en Sciences de la Vie et de la Terre, Université Ouaga I JKZ, 03 BP 7021 Ouagadougou 03
*Corresponding author. E**mail**: kab85.bouba@gmail.com/*boukarkabor18@yahoo.fr/ boureimasawadogo19@yahoo.fr*
Telephone: (+226) 71 39 83 38 / (+226) 68 53 20 49

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Solanum macrocarpon* is an important leafy and fruit vegetable of Africa used in cooking. Its leaves and fruits are also a source of income for households. Despite of its nutritional an economic potential, this species is underdeveloped in Burkina. The objective of this study is to contribute to a best knowledge of Burkina Faso's accessions of *Solanum macrocarpon* using agro-morphological descriptors. This enable to identify outstanding accessions which could be involved in further breeding programs. A total of 32 accessions collected from different cultivation area were studied. The study showed great variability for most of the qualitative and quantitative characteristics studied. This important phenotypic variability observed and the high coefficient of determination (R^2> 0.4) could be the expression of a high genotypic heterogeneity of the studied accessions. Correlation analyses between morphological traits revealed positive and negative relationships, indicating predictable success for eventual breeding activities of *Solanum macrocarpon*. The hierarchical ascending classification (CAH) reveals a distribution of the 32 accessions in 4 groups independently of the collection zone. Among these groups, the group 1 accessions (RT13, RT17, LW14 and LW16) have an important leaf biomass and the group 4 accessions (PR1, BD4, BP7 and LS13) have more fruits, and could be used as potential donors for hybridization program to develop variety with higher yield potential.

Keywords: Diversity, *Gurunsi* eggplant, *Solanum macrocarpon*, Burkina Faso

INTRODUCTION

The perdition of genetic diversity of plant species is increasingly being observed, sometimes at an alarming speed following the destruction of their natural habitats and over-exploitation (Diouf *et al.*, 2005).Supplement to these genetic erosion factors is the introduction and ladder highly cultivation of exotic varieties to substitute local varieties (Tamini *et al.*, 1995, PROTA 11, 2013). However, these local varieties play an important role in the diversification of plant resources (Saidou *et al.*, 2014). Also, these traditional varieties are genetically more diversify and better adapted to local conditions (Brown, 1982, Ahmadi *et al.*, 1988) and their protection contributes to conserve of this genetic richness (Frankel *et al.*, 1995).

Solanum macrocarpon (Gboma eggplant) is one of the important leafy and fruit traditional vegetables of Africa usedin cooking of different culinary dish. Rich in minerals, fiber and protein (Agoreyo *et al.*, 2012, Nyadanu and Lower, 2014), leaf and fruit commercialization is a source of income for many families (Adeyeye et al., 2011). *Solanum macrocarpon* is also used in traditional medicine for the treatment of various diseases such as asthma, skin infections, gastro-oesophageal reflux diseases, constipation and diabetes (Nwodo et al., 2011).

However, in Burkina Faso, *Solanum macrocarpon* is neglected by research and its potential is under-exploited by the population. Principally cultivated by the Gurunsi ethnic group, which represents only 7% of the Burkinabe population, the species is gradually abandoned due to the lack of quality seed and adapted farming practices. In addition, ravager pressure and diseases that provoked significant damage, are among the main reason to the leave of this species. For the need of documentation of this species in Burkina Faso, the present study was initiated and aims to characterize the phenotypic diversity of *Solanum macrocarpon* from Burkina Faso. It is specifically (i) to identify the discriminating characters and their correlations, (ii) to establish the level and structuring of the diversity of accessions collected.

MATERIAL AND METHODS

Plant material

Thirty-two accessions collected from Sanguié, Nahouri and Sissili provinces corresponding to the *Solanum macrocarpon* growing area were evaluated in this study (Figure 1). The characteristics of these accessions are presented in Table I.

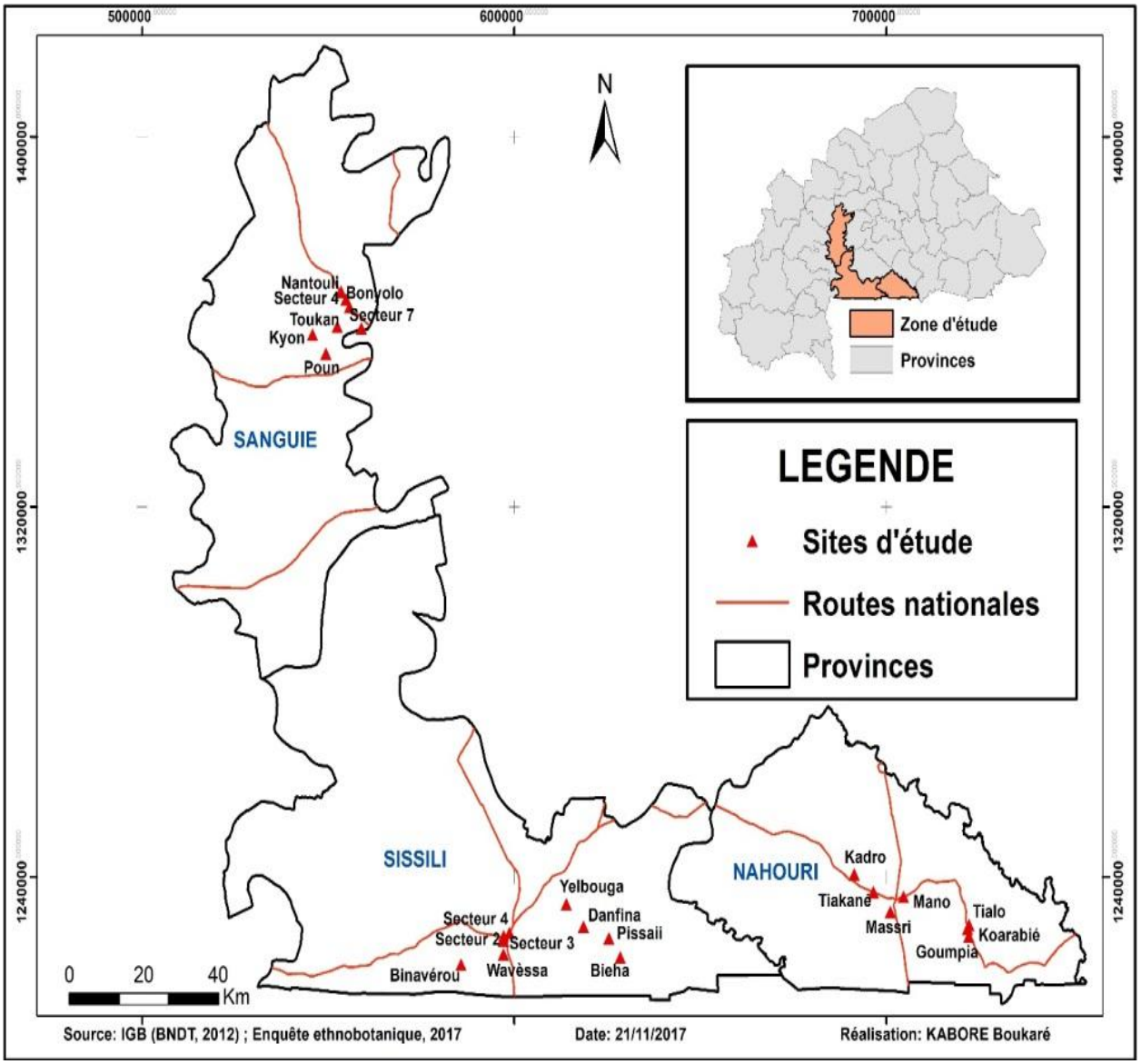

Figure 1: Investigation and collection sites of *Solanum macrocarpon* accessions

Table I: Characteristic of *Solanum macrocarpon* accessions studied

Accessions	Status	Collection site	Provinces	Climatical zones
BD4	Cultivated	BIEHA	SISSILI	SUDANIAN
BD5	Cultivated	BIEHA	SISSILI	SUDANIAN
BD6	Cultivated	BIEHA	SISSILI	SUDANIAN
BP7	Cultivated	BIEHA	SISSILI	SUDANIAN
BP8	Cultivated	BIEHA	SISSILI	SUDANIAN
LB18	Cultivated	LEO	SISSILI	SUDANIAN
LB19	Cultivated	LEO	SISSILI	SUDANIAN
LS10	Cultivated	LEO	SISSILI	SUDANIAN
LS11	Cultivated	LEO	SISSILI	SUDANIAN
LS12	Cultivated	LEO	SISSILI	SUDANIAN
LS13	Cultivated	LEO	SISSILI	SUDANIAN
LS9	Cultivated	LEO	SISSILI	SUDANIAN
LW14	Cultivated	LEO	SISSILI	SUDANIAN
LW15	Cultivated	LEO	SISSILI	SUDANIAN
LW16	Cultivated	LEO	SISSILI	SUDANIAN
LW17	Cultivated	LEO	SISSILI	SUDANIAN
RB2	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RP1	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RS10	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RS12	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT11	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT13	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT15	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT16	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT17	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT6	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT7	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT8	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
RT9	Cultivated	REO	SANGUIE	SUDANO-SAHELIAN
TG1	Cultivated	TIEBELE	NAHOURI	SUDANIAN
TG2	Cultivated	TIEBELE	NAHOURI	SUDANIAN
TG3	Cultivated	TIEBELE	NAHOURI	SUDANIAN

Experimental site

This study was carried out at the experimental station of the Institute of Rural Development (IDR) at Gampela, located on the Ouaga-Niamey axis, whose geographical coordinates are 12° 24' 29"north latitude and 1° 21' 8.6" west longitude. It is located in the North-Sudanian zone and is characterized by annual pluviometry between 600 and 900 mm (Thiombiano and Kampmann, 2010). Pluviometry recorded during the 2017 crop year was 677.1 mm of water. The test was implanted on a sand-clay soil with a water pH of 5.20.

Experimental designand cultural practices

Seedlings were first carried out in a nursery. Transplanting occurred 25 days after seeding emergence in a randomized complete block with three-repeat. The paths between the blocks were 1 m. The spacing between the elementary plots was 0.8 m and inter-plants were 0.5 m. Organic manure at a rate of 5 tones / ha was applied to the field three weeks before transplanting. The trial was irrigated twice a week from mid-September 2017 until the end of November 2017 due to prolonged water drought.

Variables observed

Twenty-seven (27) variables including 17 quantitative and 10 qualitative derived from the eggplant descriptor and studied by Nyadanu et al. (2014) and N'Gbesso et al. (2016), have been evaluated. Most observations and measurements were made from the flowering stage to the first harvest of fruit (as consumed) at four feet per line and per accession. Qualitative traits include stem color (COT), petiole color (COP), corolla color (COC), calyx color (CCA), stamens color (COE), main vein color (CNP), fruit color (COF), shape of the pistil (FOP), shape of immature fruit (FOF) and the pubescence of the limb (PBL). Quantitative traits measured are plant height (HPL), plant span (ENV), stem diameter (DIT), petiole length (LOP), limb width (LAL), limbblade length (LOL), flower length (LFL), fruit length (LOF), fruit diameter (DIF), peduncle length (LPE), number of primary branches (NBP), fruit weight (POF), number of days 50% flowering (NJL), number of days 50% fruiting (NFR), number of flowers per inflorescence flowers (NFI), number of fruits per plant (NFP) and the number of fruits per infructescence (NOF).

Data Analysis

The collected data were analyzed for variance (ANOVA) using the GenStat v4.10.3 software to determine the quantitative characteristics that discriminate accessions. Relationships between these traits were studied using Pearson correlation tests (5% level). Principal component analysis (PCA) was performed to see the associations between studies characters. Whole accessions were subsequently grouped from the hierarchical ascending classification (CAH) based on the Euclidean distance between individuals by the STATISTICA 7 software.

RESULTS

Variation of the qualitative characteristics studied

Phenotypic observations show that there is variability among the qualitative traits observed (Table II). Characters such as corolla color (COC), calyx color (CCA), main vein color (CNP) and fruit color (COF) showed more variation. Indeed, four modalities have been recorded for corolla color (COC). These are the colors white, white with violet stripe, pale violet and blue violet (Figure 2 A-D). The same number of modalities was observed with characters' calyx and fruit color (CCA and COF). These concerned especially creamy white fruit with violet-calyx, dark green with purple-calyx, stripe-green with green-calyx and oyster green with oyster green-calyx fruit accessions (Figure 3 A-D). The accessions with creamy white fruits come from Sanguié while those with white fruits are from Sissili. But on the other hand, green fruit accessions with dark stripe or oyster strip are not specific to a given area. They come from the three provinces surveyed. Concerning the color of the stem, all other accessions of Sanguié are green stems at the flowering stage excepted of one that is purple green. The accessions of Nahouri and Sissili are either green stems or green purple. Two forms of fruit were observed, namely oval and round. The majority of accessions (71.88%), have non-pubescent leaves.

Table II: Frequencies of the qualitative characteristics of *Solanum macrocarpon* observed

Characters	Modalities	Effective	Frequencies (%)
COT	Green	23	71,88
	Green violet	9	28,12
PBL	Pubescent	9	28,12
	No pubescent	23	71,88
COP	Green	29	81,25
	Violet green	2	6,25
	Violet	2	6,25
CNP	White	4	12,5
	Green	13	40,62
	Violet	8	25
	Violet green	7	21,88
CCA	Green	14	43,75
	Violet	5	15,62
	Purple	1	3,13
	Violet green	12	37,5
COC	White	10	31,25
	Violet white	7	21,88
	Pale violet	5	31,25
	Violet	10	15,62
COE	Yellow	32	100
FOP	Short	2	6,25
	Way	24	75
	Long	6	18,75
FOF	Oval	21	65,62
	Round	11	34,38
COF	White	8	25
	Cream green	5	15,62
	Green dark stripe	12	43,75
	Zebra	5	15,62

stem color (COT), petiole color (COP), corolla color (COC), calyx color (CCA), main vein color (CNP), pistil shape (FOP), pupal pubis Leaf blade (PBL), Immature fruit shape (FOF), Fruit color (COF).

Figure 2: *Solanum macrocarpon*corolla colors

Figure 3: *Solanum macrocarpon* fruit and calyx colors

Variation of quantitative traits studied

Analysis of variance reveals highly significant differences between accessions for all traits studied at the 5% level. This reflects the existence of significant phenotypic variability between these accessions (Table III). The coefficient of determination (R^2) is very high for all the studied characters and varied from 0.452 to 0.777 (Table III). The Newmann Keuls comparison test showed that 9 out of 32 accessions have outstanding performance. Indeed, 5 accessions presented a significant vegetative development (HPL, LOL, LAL and ENV) and with big fruits. These are RP1 (Sanguié), BD4, BP7, LS13 (from Sissili) and TG2 (Nahouri). The other 4 accessions such as RT13 and RT17 (Sanguié), LW14 and LW16 (Sissili) had a short cycle (on average of 32 days after transplanting) and a high number of fruits per plant.

Table III: Performance of accessions of *Solanum macrocarpon*

Variable	Minimum	Mean	Maximum	%cv	R^2	F pr.
NJF (day)	29.00	37.09	47.00	7.41	0.654	<.001**
NFR (day)	32.00	40.74	49.00	6.92	0.681	<.001**
HPL (cm)	15.67	28.52	67.50	22.34	0.635	<.001**
DIT (cm)	1.057	1.584	2.533	18.63	0.452	0.071ns
NBP	4.333	6.872	10.33	14.99	0.522	0.001**
LOP (cm)	2.167	4.549	7.500	16.03	0.725	<.001**
LOL (cm)	15.75	25.36	33.17	9.34	0.758	<.001**
LAL(cm)	11.75	16.84	22.70	9.97	0.641	<.001**
NFI	3.333	6.865	10.33	13.69	0.595	<.001**
LFL (cm)	2.500	4.737	6.667	12.92	0.565	<.001**
LPE (cm)	0.8333	1.616	4.833	25.30	0.637	<.001**
NOF	1.000	1.604	2.667	10.60	0.899	<.001**
NFP	7.000	12.88	23.67	19.48	0.650	<.001**
ENV (cm)	38.33	66.24	90.00	11.79	0.527	0.002**
LOF (cm)	3.860	4.972	6.100	6.71	0.662	<.001**
DIF (cm)	4.660	5.936	7.275	7.39	0.716	<.001**
POF (g)	49.74	97.54	170.3	16.45	0.777	<.001**

Plant Height (HPL), Plant span (ENV), Stem Diameter (DIT) Petiole Length (LOP), Peduncle Length (LPE), Limb Width (LAL), Leaf Length (LOL), Length of flower (LFL), Fruit length (LOF), Fruit diameter (DIF), Number of primary branches (NBP), Fruit weight (POF), Number of days 50% flowering (NJL), Number of days day 50% fruiting (NFR), number of flowers per inflorescence flowers (NFI), number of fruits per plant (NFP), number of fruits per infructescence (NOF)

Correlation between the characters studied

Table IV shows correlations obtained between studied characters (level of 5%). On the one hand, positive correlations were observed between plant height and variables leaf length (r = 0.677) and fruit diameter (r = 0.644). The same results are observed for cycle of 50% flowering and the variables size of the plant (r = 0.390), diameter of the fruit (r = 0.471), number of days 50% fruiting (r = 0.957) and weight of the fruit (r = 0.535). On the other hand, some important negative correlations are observed between the number of fruits per plant and the variables 50 %flowering(r = -0.465), weight of the fruit (r = -0.409), size of the plant (r = -0.361), fruit diameter (r = -0.463) and fruit length (r=-0.494).

Table IV: Correlation among some of the agro-morphological traits

CHAR	NJF	NFR	HPL	DIT	NBP	LOP	LOL	LAL	NFI	LFL	LPE	NOF	NFP	ENV	LOF	DIF	POF
NJF																	
NFR	**0,957**																
HPL	**0,626**	**0,530**															
DIT	**0,357**	**0,365**	**0,599**														
NBP	0,052	0,039	-0,001	-0,192													
LOP	-0,007	0,034	-0,237	-0,013	0,194												
LOL	**0,641**	**0,547**	**0,677**	0,323	-0,063	-0,011											
LAL	**0,479**	**0,430**	**0,560**	**0,446**	-0,033	0,280	**0,722**										
NFI	-0,036	-0,104	0,262	0,044	-0,095	0,141	**0,388**	**0,432**									
LFL	0,021	0,113	-0,176	0,127	0,230	**0,416**	-0,230	0,038	-0,189								
LPE	**0,348**	**0,426**	0,018	-0,106	**0,499**	0,226	0,088	0,018	-0,232	**0,360**							
NOF	0,171	0,155	0,280	0,041	-0,137	-0,224	0,326	**0,391**	0,270	**-0,414**	-0,122						
NFP	**-0,465**	**-0,397**	**-0,361**	-0,308	0,021	-0,234	-0,275	-0,176	-0,087	0,115	-0,056	0,203					
ENV	**0,390**	**0,335**	**0,628**	**0,391**	0,177	0,318	**0,717**	**0,716**	**0,452**	-0,013	0,052	0,240	-0,244				
LOF	**0,532**	**0,523**	**0,362**	0,305	-0,202	0,242	**0,394**	**0,487**	0,143	0,128	0,105	0,095	**-0,494**	**0,387**			
DIF	**0,471**	**0,406**	**0,644**	**0,373**	**-0,363**	-0,011	**0,639**	**0,561**	0,295	-0,238	-0,071	0,290	**-0,463**	**0,556**	**0,757**		
POF	**0,535**	**0,505**	**0,611**	**0,441**	-0,252	-0,037	**0,615**	**0,436**	0,176	-0,036	0,136	0,053	**-0,409**	**0,454**	**0,738**	**0,859**	

Plant Height (HPL), Plant span (ENV), Stem Diameter (DIT), Petiole Length (LOP), Peduncle Length (LPE), Limb Width (LAL), Leaf Length (LOL), Flower length (LFL), Fruit length (LOF), Fruit diameter (DIF), Number of primary branches (NBP), Fruit weight (POF), Number of days 50% flowering (NJL), Number of days 50% fruiting (NFR), Number of flowers per inflorescence flowers (NFI), Number of fruits per plant (NFP), Number of fruit per infructescence (NOF).

Structuring the phenotypic variability of *Solanum macrocarpon* accessions

Correlation analysis between morphological traits allowed 12 less correlated characters to be selected for multivariate analysis.

Association of characters

The total variability expressed by the first two axes is 51.03% (Table V). Axis 1 expresses 31.76% of this total variability. Six characters contribute the most to achievement of axis 1. These are variables number of days 50% flowering (NJF), plant height (HPL), stem diameter (DIT), petiole length (LOP), Plant span (ENV), fruit weight (POF). The number of primary branches (NBP), the number of flowers per inflorescence (NFI), peduncle length (LPE) and flower length (LFL) are correlatedwiththeaxis-2.

Table V: Principal components analysis of agro-morphological traits of the 32 accessions of *Solanum macrocarpon*

Characters	F1	F2	F3
NJF	**0,521**	0,065	0,009
HPL	**0,643**	0,075	0,002
DIT	**0,411**	0,016	0,224
NBP	0,009	**0,344**	0,325
LOP	**0,392**	0,121	0,002
NFI	0,180	**0,435**	0,096
LFL	0,087	**0,424**	0,055
LPE	0,074	**0,477**	0,153
NOF	0,006	0,276	**0,325**
NFP	0,354	0,000	0,069
ENV	**0,569**	0,033	0,119
POF	**0,568**	0,048	0,019
Proper value	3,811	2,313	1,398
Variability (%)	31,760	19,278	11,651
% cumuli	31,760	51,038	62,689

Plant height (HPL), Stem diameter (DIT), Petiole length (LOP), Flower length (LFL), Fruit weight (POF), Number of primary branches (NBP), Number of days 50% flowering (NJL), number of flowers per inflorescence flowers (NFI), number of fruits per plant (NFP), number of fruits per infructescence (NOF), peduncle length (LPE), Plant span (ENV).

Structuring the diversity of accessions studied

The dendrogram resulting from the hierarchical ascending classification (CAH) of figure 4 reveals a distribution of the 32 accessions in 4 groups. This structuring is done independently of the origin of the accessions. The Wilks Lambda test gives values of observed F and critical F respectively of 2.797 and 1.540 with a p-value <0.0001 between the 4 groups obtained, showing that they are very distinct. In addition, an examination of Fisher's F statistic values indicates that five characters (HPL, DIT, NFI, POF and ENV) are more discriminating with relatively high F values. These results are confirmed by the Newmann Keuls test (Table VI).

Group 1 consists of 7 accessions that separate from each other at the first node of the dendrogram. These accessions come from the three provinces, including 1 from Nahouri, 2 from Sanguié and 4 from Sissili. This group is characterized by low height and stem diameter and high fruit numbers. Group 2 includes 13 accessions from the three provinces, including 2 from Nahouri, 5 from Sanguié and 6 from Sissili. This group is characterized by intermediate performance plants. Group 3 consists of 6 accessions including 3 of Sanguié and 3 of Sissili, is also characterized by intermediate performance plants. Nevertheless, it differs to Group 2 in the higher fruit weight (POF) and fruit number per plant (NFP). Group 4 contains 6 accessions including 3 from Sanguié, 3 from Sissili. These accessions are characterized by long-cycle plants with high vegetative growth and produce less fruit.

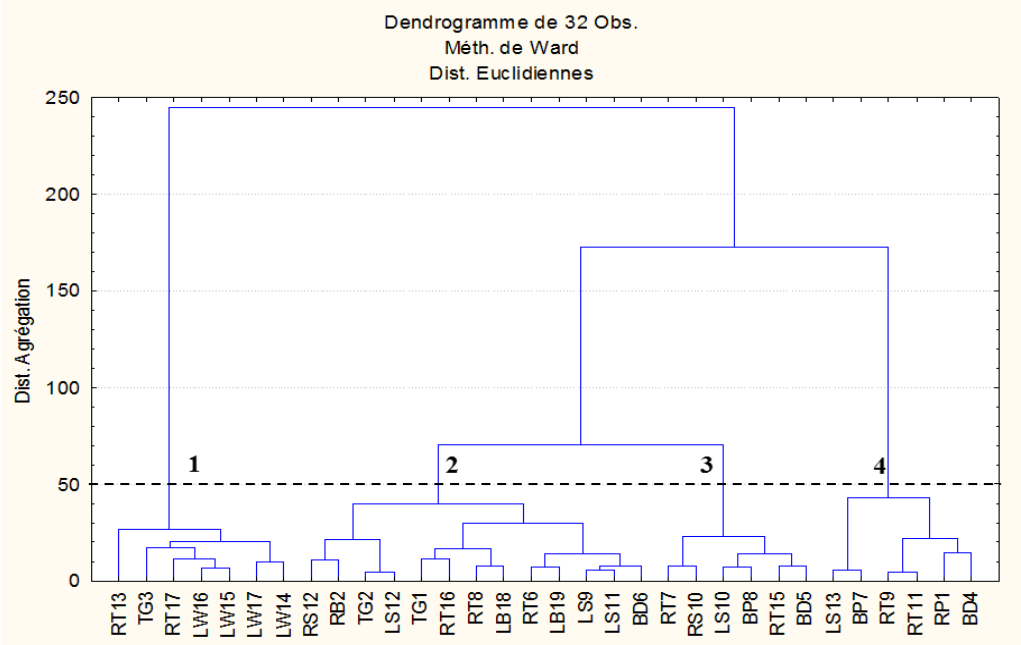

Figure 4: Dendrogram of 32 accessions of *Solanum macrocarpon* collected in western Burkina Faso

Table VI: Evaluation of the average performance of the 4 groups by the Newmann Keuls test

Groups	NJF	HPL	DIT	NBP	LOP	NFI	LFL	LPE	NOF	NFP	ENV	POF
1	35,000b	23,075cb	1,543b	7,063a	3,983a	5,856b	4,788a	1,478a	1,333b	13,968ab	58,960b	69,428d
2	37,385ab	28,831ba	1,506b	7,051a	4,639a	7,036a	4,621a	1,628a	1,812a	12,538ab	67,611a	92,677c
3	37,278ab	28,259bc	1,608ab	6,389a	4,830a	7,296a	4,933a	1,715a	1,519ab	14,463a	68,292a	109,286b
4	38,722a	34,469a	1,779a	6,741a	4,731a	7,243a	4,731a	1,650a	1,556ab	10,759b	69,708a	129,119a

The averages of the same column with different letters are significantly different at the 5% threshold by the Newmann Keuls test. The averages followed by the same letter are not significantly different at the 5% level.

Plant height (HPL), Stem diameter (DIT), Petiole length (LOP), Flower length (LFL), Fruit weight (POF), Number of primary branches (NBP), Number of days 50% flowering (NJL), Number of flowers per inflorescence flowers (NFI), Number of fruits per plant (NFP), Number of fruit per infructescence (NOF), Peduncle length (LPE), Plant span (ENV).

DISCUSSION

Morphological and agronomic characteristics have been studied in the same environmental context of soil and climate. As a result, variations in observed traits result from the expression of genotypes or accessions. The studied collection presents a polymorphism for most characters. Indeed, the large differences between the minimum and maximum values, the high coefficients of variation for most characters, as well as the presence of several modalities for certain qualitative characters reflect the existence of high morphological variability within accessions. This offers opportunities for improvement of *Solanum macrocarpon* grown in Burkina Faso. These results are in agreement with those of Nyadanu et al. (2014), Bationo / Kando et al. (2015) and Sawadogo et al. (2016), who also reported agromorphological variability in African eggplants. The accessions are mostly variable for the color and shape characteristics of organs, in particular that of flowers and fruits. Our results support previous studies of the variability of *Solanum macrocarpon* (Nyadanu et al., 2014, N'Gbesso et al., 2016). Indeed, according to Chinedu et al. (2011) and Osei et al. (2010), African eggplants show great variability in fruit shapes, color and size. This great morphological diversity could be explained by the different agro-climatic conditions in relation to the farmer's

practices of management and conservation of this plant genetic resource. According to Nyadanu et al. (2014), adaptation to local climatic conditions and farmer selection of some desirable traits over the years, seems to have generated a significant degree of differentiation in local varieties of eggplant, giving rise to a large number of generally on the morphology of fruits. However, the weak intensity of the violet color of the corolla and the presence of white corolla differ from the observations made by Nyadanu et al. (2014), and could be explained by differences in agro-climatic conditions in both countries. Indeed, in Burkina, lighting is more important than in Ghana. Thus, illumination could be a differentiating factor in the expression of morphological characters studied. In contrast, studies of *Solanum macrocarpon* from Ghana revealed more diversity for the characteristics of the fruit and as such would have brought to Burkina Faso from this country.

In fact, in Burkina Faso, *Solanum macrocarpon* is grown only by one ethnic group living in three provinces, two of which are neighboring Ghana. In the collection studied, the distribution of fruit color is a function of the collection area. Indeed, the Sanguié accessions have all produced green fruits. While, those of Sissili are dominated by morphotypes with white fruits. This difference could be explained by the selection method operated by the producers in the collection areas.

The positive correlations observed between vegetative traits and fruit diameter mean that morphotypes that have expressed great vigor in size, leaf area, and leaf cover on the ground are those that produce large fruits. However, negative correlations between the 50%flowering cycle (NJF) and fruit diameter (DIF) show that long cycle plants will produce small fruits and vice versa. Which would limit in selection of *Solanum macrocarpon*, the possibilities of obtaining cultivars with early cycle and producing big fruits. Nyadanu et al. (2014) and N'Gbesso et al. (2016) reported similar results for *Solanum macrocarpon* in Ghana and Côte d'Ivoire respectively, as was Bationo / Kando et al. (2015) and Sawadogo et al. (2016) on *Solanum aethiopicum* Kumba group in Burkina Faso.Principal component analysis showed that the number of branches, plant height, stem diameter, and plant span discriminate more against accessions. These factors could be used as useful traits that most effectively differentiate eggplant accessions.

Although the structuring of the agro-morphological variability was random, probably in response to the management of the seed, group 3 brings together the accessions of the provinces of Sanguié and Sissili having a long cycle and a significant vegetative development. Indeed, in the province of Sissili, *Solanum macrocarpon* is produced mainly for its leaves, the size of the plant could be an interesting character in the case of the improvement of leaf biomass.

The height of the plant, the length and the width of the leaves, the size of the plant and the duration of the reproduction cycle are the main characters which make it possible to discriminate these 4 groups. There is a strong positive and significant correlation between size (HPL) and leaf-related traits. Since Group 3 individuals are large and highly vegetative, they could therefore be used as begetter in high yielding foliar biomass breeding programs. Group 1 individuals are small and have a high fruit count. As a result, they can be used as broodstock for the creation of high yielding fruit varieties. Thus, accessions such as (RT13, RT17, LW14 and LW16) and (RP1, BD4, BP7 and LS13) respectively of group 1 and group 4 could constitute the potential begetter

CONCLUSION AND RECOMMENDATION

The agro-morphological characterization of the accessions of *Solanum macrocarpon*, allowed to underline the existence of a diversity although its zone of culture is narrow. Multivariate analysis structured the collection into four morphological groups based on plant height, leaf length and width, plant size, and length of reproductive cycle. This study identified exceptional morphotypes that could be considered potential breeding grounds for future breeding work. These are mainly TG2, RP1, BD4, BP7 and LS13 for leaf biomass production and RT13, RT17, LW14 and LW16 accessions for fruit production. The existence of several discriminating characters and numerous correlations between these characters offer possibilities for varietal selection within the accessions of *Solanum macrocarpon*. For this reason, this agro-morphological characterization could be supplemented by more in-depth studies, particularly on the biochemical and molecular levels.

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