Morphological diversity of *Cleome gynandra* (L) Briq. germplasm from six African countries

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Background

Cleome gynandra L., also called spider plant as one of its common names, among other African leafy vegetables make a huge nutritional contribution to daily diets in many sub-Saharan Africa countries. The demand is on the rise. However, its production is still based on low yielding farmers' cultivars due to little research attention especially until recently, hence scarce information regarding the extent of phenotypic variation within and among populations to enable genetic improvement programmes. This study, therefore, assessed the level of genetic diversity using 30 accessions from 6 African countries based on phenotypic markers under field conditions.

Materials and methods

Field experiment was carried out at Jomo Kenyatta University of Agriculture and Technology (JKUAT) , Juja, Kenya (S01˚05.9' E037˚00.8, 1476 m a.s.l), October - Dec. 2015

- 30 accessions from 6 countries (Tab. 1)
- Complete Randomized Block Design with 4 replications
- 40 plants per plot with 28 plant in the middle rows selected for evaluation.
- 8 qualitative and 16 quantitative traits (Tab. 2) as described in FAO(1995) were used and evaluation during the first flower appearance.

Table 1: Spider plant accessions

Accessions	Country of Origin
HTT	Kenya
Abuku 1	Kenya
Abuku 2	Kenya
Acc 3	Kenya
Acc 5	Kenya
Acc 6	Kenya
Acc 20	Kenya
Acc 21	Kenya
Acc 26	Kenya
Acc 28	Kenya
MLSF17	Malawi
MLSF12	Malawi
MLSF27	Malawi
RWSF2	Rwanda
RWSF3	Rwanda
IP 8	South Africa
IP 12	South Africa
ST93-1(GS)	Tanzania
ST73-3	Tanzania
IP7	Tanzania
GS	Tanzania
PS	Tanzania
Site 94	Tanzania
UGSF 13	Uganda
UGSF17	Uganda
UGSF29	Uganda
UGSF19	Uganda
UGSF26	Uganda
UGSF2	Uganda

Table 2: Traits used in the field analysis

Quantitative traits	Qualitative traits
Height	Flower colour
Primary Branch no.	growth habit
Internode no	leaf shape
No. Leaflet/leaf	Petiole colour
Leaf fresh mass	petiole hairiness
Stem fresh mass (g)	stem colour
Total fresh mass (g)	stem hairiness
leaf dry mass	
stem dry mass	
total dry mass	
Days to 50% flowering	
Days to 50% fruiting	
Pod weight (g)	
Germination percentage	
No. of seeds/silique	
100 seed weight (g)	

Results and Discussion

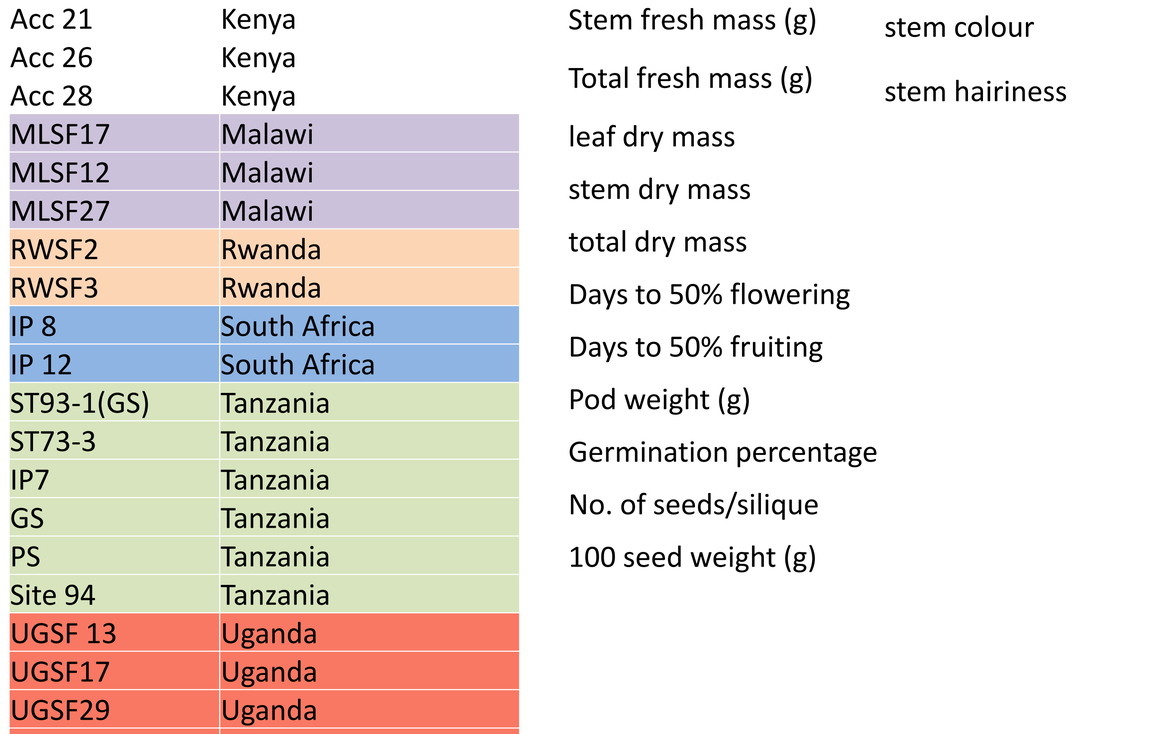

Figure 1: Fresh and dry mass per plant after 9 weeks.

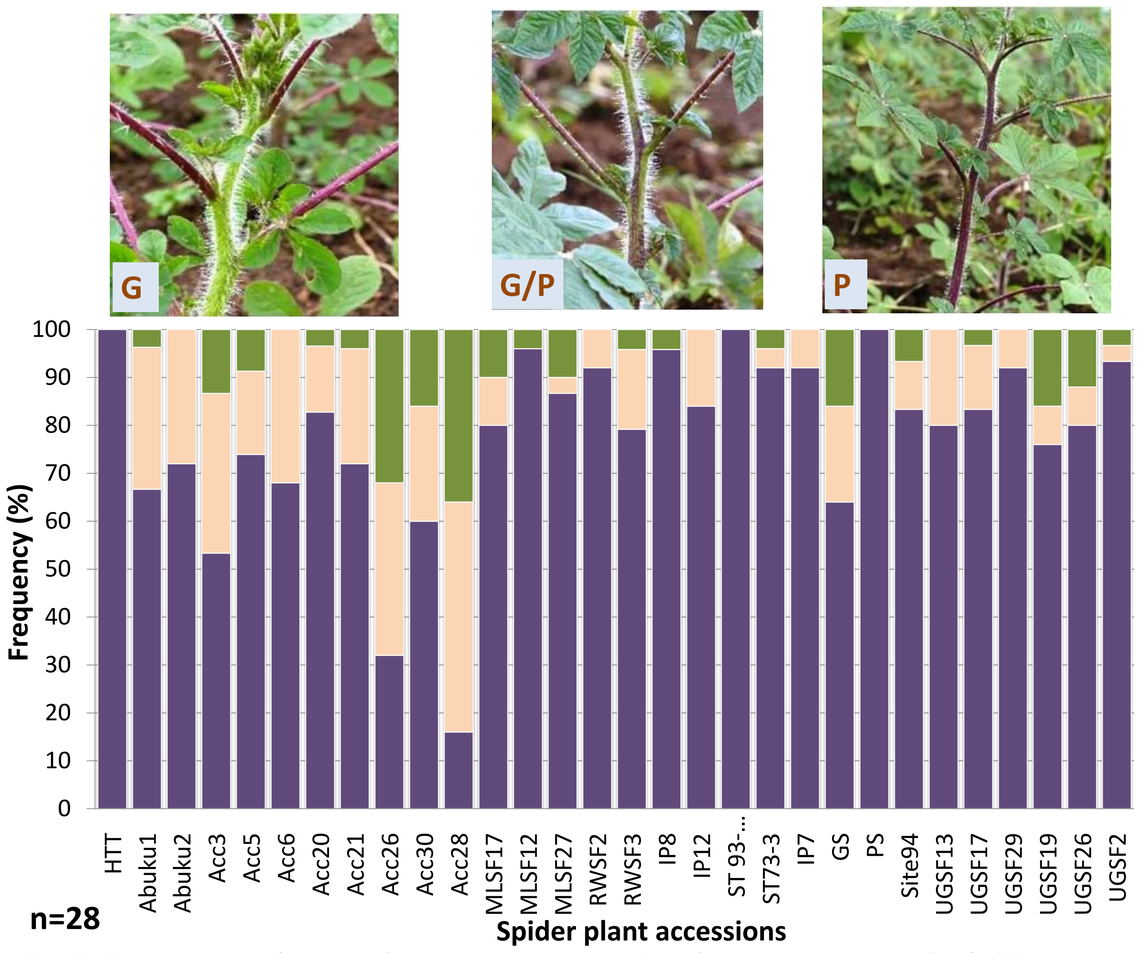

Fig. 2: Frequencies of stem colour variations in spider plant accessions in the field.

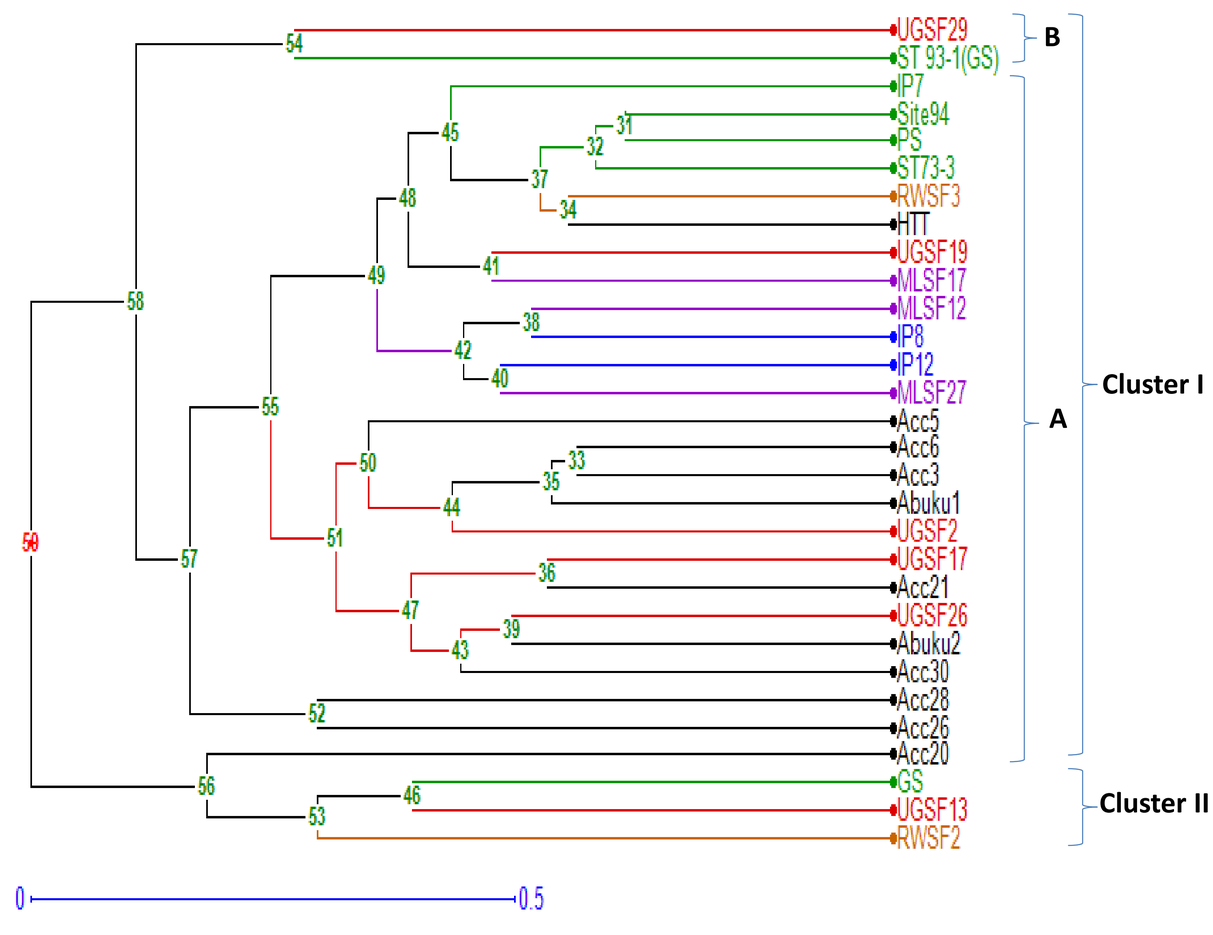

Fig 3: Unweighted pair-group method using arithmetic averages clustering analysis phenogram showing the relationship among 30 spider plant accessions grown in the field based on the qualitative traits. Numbers represent node formation numbers.

- Average leaf fresh mass per plant was 40 g with a range of 25-70 g at flowering.
- Variation was observed within and among accessions with respect to various qualitative traits e.g. stem colour (Fig.2) , stem hairiness, petiole colour and hairiness, leaf shape and number of leaflets per leaf among others.
- 2 main cluster were obtained using the qualitative traits data (Fig. 3), but no clustering according to country of origin was observed.

Conclusions

- High variation within accessions for the traits evaluated was observed.
- No clustering according to countries was observed.
- Diversity within and among accessions observed in the field study could be useful for selection in breeding programmes for traits of interest.

Outlook

- Evaluation of secondary metabolites (glucosinolates and flavonoids).
- Evaluation of the genetic diversity by AFLP and SSR markers.

Reference: Food and Agricultural Organisation (FAO) (1995) Production year book. Vol. 49. FAO- Rome, Italy.

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