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Analysis of Diversity of Scarlet Eggplant from Garo Hills of Meghalaya

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ABSTRACT

Diverse genetic material to initiate plant breeding in scarlet egg plant (*Solanum aethiopicum* L.) is available but lacks in characterization and trait evaluation. Meghalaya provides a hotspot for biodiversity of *Solanum aethioipcum* L. This crop occurs widely but is not commercially grown in a wide range. Nine germplasm lines of scarlet egg plant were collected from different parts of Garo Hills of Meghalaya, India and were characterized based on four quantitative traits like fruit length, fruit breadth, fruit pedicel length and fruit weight. The diversity of this crop was analysed by statistical analysis using randomized block design. Highly significant differences were revealed among the selected germplasm lines indicating a wide variability of each trait studied.

Keywords: *Solanum aethiopicum* L., quantitative trait, randomized block design, variability

Scarlet egg plant (*Solanum aethiopicum* L.) is a wild crop of Solanaceae family; usually found to be widely scattered in rural and urban communities of Garo Hills of Megahalaya, India. The cytological studies of *Solanum aethiopicum* L. showed the diploid chromosome number of 2n=24 (Wahua and Olaleye, 2013). The plant is a shrub growing upto a height of about 200 cm often much branched. The fruit is light to dark green, white or blackish in colour and as they ripen it turns to red or reddish orange due to high carotene content. Fruit is a berry with round to oval sometimes depressed globose with smooth or grooved surface. The taste of the fruit varies from sweet to bitter and the bitterness depends on the level of saponin. Scarlet egg plant is one of the major sources of biologically active nutritional substances and metabolites which are essential for plant growth, development and stress adaption. Among these metabolites, carotenoids which act as accessory pigments for photosynthesis and precursor to plant hormones (Elias *et al.*, 2016).

In Meghalaya it is locally known as kimka baring. The fruits are harvested when it is immature and still green before the skin becomes thick. The fruits and leaves are used as a vegetable. The fruit has a high medicinal property due to its bitterness. The intakes of leaves and fruits have favourable impact on the incidence of many chronic diseases including diabetes (Elias *et al.*, 2016). The extract of leaves shows potential on certain liver functions, anti-oxidative and anti-lipid peroxidation (Olaniyi *et al.*, 2015).

Meghalaya provides a rich genetic variability and a hotspot for the biodiversity of this crop, even though, the genome of *Solanum aethipicum* L. stills remains unexplored as compared to the other Solanaceae crop. Variations in diversity of scarlet egg plant from Garo Hills of Meghalaya, India have not been extensively studied. Lack of variations in the genomic constituents of the species is hindering the development of new varieties and traits. Thus by carrying out the systematic study on the quantitative traits of different germplasm lines of scarlet egg plant will enable us to know scientifically more on this crop and helps to prevent the genetic erosion.

MATERIALS AND METHODS

Nine germplasm lines of scarlet egg plant were collected from different parts of Garo Hills, Meghalaya, India and accession number were assigned (Table 1).

Table 1. Sources of collection of the Scarlet egg plant (*Solanum aethipicum* L) germplasms

Sl No.	Germplasm accession no.	Place of collection
1	SA 1	Asanang
2	SA 2	Chasingre
3	SA 3	Dakopgre
4	SA 4	Danakgre
5	SA 5	Garobada
6	SA 6	Hawakhana
7	SA 7	Jengjal
8	SA 8	Rongram
9	SA 9	Williamnagar

Scarlet egg plant germplasms were evaluated and characterized according to four (4) quantitative horticultural traits like fruit length (cm), fruit breadth (cm), fruit pedicel length (cm) and fruit weight (kg). Field experiment was conducted in randomized block design (RBD) with three replications. Initially the seed were sown in the row in line by broadcasting and later 5 plants per germplasm were maintained. Recommended cultural practices were followed throughout the crop season. Statistical analysis of obtained data was carried out following Panse and Sukhatme (1969) method using SPSS version 16 statistical package.

RESULTS AND DISCUSSION

Analysis of variance for four quantitative characters that is fruit length, fruit breadth, fruit pedicel length and fruit weight are presented in Table 2. Statistical analysis revealed highly significant differences among the scarlet egg plant genotypes for fruit breadth, fruit pedicel length and fruit weight, and significant differences for fruit length. It clearly indicated that there was sufficient variability for each trait among genotypes selected for study.

Table 2: Analysis of variance of 4 characters of Scarlet egg plant

Source of variation	Degree of freedom	Mean square			
		Fruit length	Fruit breadth	Fruit pedicel length	Fruit weight
Replication	2	0.7320	3.6519	0.6400	7.9238
Treatment	8	3.6751*	7.5316**	11.9200**	812.1412**
Error	16				

Table 3: Mean table for different quantitative characters of Scarlet egg plant.

Genotypes	Fruit length (cm)	Fruit breadth (cm)	Fruit pedicel length (cm)	Fruit weight (kg)
SA1	2.20	3.23	1.85	0.186
SA2	2.10	3.45	2.00	0.404
SA3	2.36	3.30	2.00	0.118
SA4	2.33	3.53	1.75	0.108
SA5	2.33	4.40	1.60	0.150
SA6	2.30	4.36	1.70	0.110
SA7	2.00	2.63	1.85	0.165
SA8	2.71	3.50	1.95	0.180
SA9	2.18	3.03	1.70	0.110
Grand Mean	2.28	3.49	1.70	0.170
Sem	0.106	0.209	0.041	0.003
CD 5%	0.319	0.628	0.124	0.009
CD 1%	0.439	0.865	0.172	0.013

From the study it was found that the genotype SA8 was having the highest fruit length of 2.71 cm whereas the genotype SA7 was having the lowest fruit length of 2.00 cm. The grand mean was observed to be 2.28 cm for fruit length. The genotype SA5 was found to be having the highest fruit breadth of 4.40 cm whereas the genotype SA7 was having the lowest fruit breadth of 2.63 cm. The grand mean for fruit breadth was observed to be 3.49 cm. The genotype SA2 and SA3 was found to be having the highest fruit pedicel length of 2.00 cm whereas the genotype SA5 was having the lowest fruit pedicel length of 1.60 cm. The grand mean was observed to be 1.70 cm for fruit pedicel length. The genotype SA2 was found to be having the highest fruit weight of 0.404 kg whereas the genotype SA4 was having the lowest fruit weight of 0.108 kg. The grand mean for fruit weight was observed to be 0.170 kg. The observed data from the study clearly indicated that there was a sufficient variability for each trait among the selected genotypes. Similar results were also reported by Polignano *et al.* (2010) for *Solanum melongena*.

CONCLUSION

Diversity study on scarlet egg plant (*Solanum aethiopicum* L.) genotypes from different parts of Garo Hills, Meghalaya, India showed a wide variability based on their quantitative traits. Comparing to other Solanaceous vegetables of Garo Hills of Meghalaya, India, *Solanum aethiopicum* L. is less utilized and not much research has been found from this area. As it is having a wide variability, further studies on this crop can be done for conserving and preventing the genetic erosion and genetic drift of this crop and also conserve the landraces and wild cultivars. The medicinal and nutritional properties can be explored and can also be used in different breeding programmes, in improving and developing new varieties having potential or resistant to different biotic and abiotic stresses.

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CONFLICT OF INTERESTS

The authors declare that they have no competing interests for the work.

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