Original Research Article

DUS characterization in brinjal (S*olanum melongena* L.) germplasm

ABSTRACT

Extensive diversity exists in cultivated brinjal in terms of its agro-morphological traits. Comprehensive field surveys were performed and sixteen pure, local types of brinjal accessions were collected and evaluated. The aim of present study was to assess the nature of genetic variation for qualitative characters in brinjal and to identify most promising genotypes for utilization in crop improvement programmes. Sixteen qualitative characters were subjected to evaluation as per DUS guidelines. Variations were recorded for most of the characters such as flower colour (purple/white/green); presence or absence of spines on leaves, calyx,; calyx colour (purple/green); varying fruit shape such as elongated (ellipsoid and cylindrical), round (globular, ovoid and obovate) and oval (pear and club shaped). The present study documented the brinjal genetic resources for the east coastal regions of Tamilnadu which are under cultivation in these regions for further evaluation and utilization in crop improvement programs.

***Keywords*:** Brinjal, DUS, descriptors, qualitative characters

1. INTRODUCTION

Brinjal (S*olanum melongena* L.) is one of the major vegetable crops and India is the second largest producer. The solanaceae family consists of over 98 genera and over 2000 species. The genus *Solanum* comprises approximately 200 tuber bearing and 1800 non-tuber bearing species. *Solanum melongena* L. (2n= 2x =24), known as brinjal is popular in Indian subcontinents (Dharmendra Patidar, 2015). Understanding genetic diversity and population structure in brinjal would jepl identify the diverse parents for crop improvement (Liu et al. 2018; Younas et al. 2022). Precise morphological descriptions of cultivars have been found to be a proven and reliable strategy in identification and classification of crop varieties in addition to more advanced molecular marker techniques (Tiwari et al. 2009; Bhatt et al. 2022; Paul and Dhas, 2023). Qualitative characterization is essential for the identification of accessions harbouring beneficial trait(s)/allele(s) so that they could be directly released as a cultivar or utilized as parent in crop improvement programme (Upadhyaya et al. 2006). Study of qualitative characters as per the guideline of Protection of Plant Varieties and Farmers' Right (PPV & FR) Authority is an efficient and most essential to catalogue and maintain large germplasm sets. DUS (distinctness, uniformity, stability) characters distinguish genotypes and help in their maintenance as true to type and also utilization for future breeding program. Studies targeting collection of existing variability and their qualitative DUS characterization would help to avoid duplications and distinctness of the new varieties from the existing varieites. Therefore, present study was conducted to characterize the brinjal genotypes for DUS characters.

2. MATERIALS AND METHODS

The experimental material consisted of 16 genotypes representing various local types collected across north-east coastal regions of Tamilnadu. These genotypes were evaluated at Vegetable Research Station (TNAU), Palur during Kharif 2018 in Randomized black design in three replications. The observations were recorded on five randomly selected plants. The qualitative characters were recorded as per the DUS guidelines given by PPV&FRA, 2001. Notes (1 to 9) were used to describe the state of each character for the purposes of digital data processing and these notes had given against the states of the different characteristics. The detail status were recorded for sixteen qualitative characters such as plant growth habit, stem anthocyanin colour, stem pubescence, leaf margin, leaf blade colour, leaf blade prickliness,

flower colour, fruit shape, fruit colour, fruiting pattern, fruit stripes, fruit patches, fruit size of calyx, flesh density and seediness.

3. RESULTS AND DISCUSSION

Sixteen brinjal genotypes collected from various districts of north-eastern coastal zone of Tamilnadu were raised and sixteen qualitative characters were recorded using morphological descriptors (Table 1).

Table 1. Morphological descriptors, states and their frequency among brinjal germplasm

S. No.	Descriptors	States	No. of genotypes	Frequency (%)
1	Plant Growth Habit	Erect	16	100.00
		Semi spreading	-	-
		Spreading	-	-
2	Stem Anthocyanin Colour	Absent	2	12.50
		Present	14	87.50
3	Stem Pubescence	Weak	-	-
		Medium	16	100.00
		Strong	-	-
4	Leaf Margin	Entire	16	100.00
		Dentate	-	-
		Sinuate	-	-
5	Leaf Blade Colour	Green	13	81.25
		Purple	3	18.75
6	Leaf Blade Prickliness	Absent	4	25.00
		Present	12	75.00
7	Flower Colour	White	1	6.25
		Light Purple	12	75.00
		Purple	3	18.75
8	Fruit Shape	club shaped	1	6.25
		ellipsoid	2	12.50
		ovoid	2	12.50
		obovate	5	31.25
		globular	4	25.00
		pear	1	6.25
		cylindrical	1	6.25
9	Fruit Colour	Green	2	12.50
		Purple	13	81.25
		White	1	6.25
10	Fruiting Pattern	Solitary	13	81.25
		Cluster	3	18.75
11	Fruit Stripes	Absent	14	87.50
		Present	2	12.50
12	Fruit Patches	Absent	16	100.00
		Present	-	-
13	Size of Calyx	Small	2	12.50

		Medium	12	75.00
		Large	2	12.50
14	Flesh Density	Medium	11	68.75
		Compact	5	31.25
15	Seediness	Low	3	18.75
		Medium	11	68.75
		High	2	12.50
16	Leaf spininess	Absent	16	100.00
		Present	-	-

All the genotypes exhibited erect type of plant growth habit. Majority of the genotypes had pigmented stem (87.5%) while Sm6 and Sm8 were the only two genotypes possessed stems without pigmentation. All the genotypes exhibited medium hairiness on the stem and entire leaf margin. Only in 25% of the total genotypes were of leaf blade with prickliness. Brinjal cultivars with smooth textured leaves were more preferred by the jassids compared to the cultivars with leaves having leathery texture and leathery texture with spines (Deole, 2008). About 81.25% of the genotypes exhibited green coloured leaf blades. Among sixteen genotypes, majority of the genotypes were of light purple flower (75.0%), while Sm11 exhibited white colour flower whereas, Sm2, Sm4 and Sm7 had purple. None of the genotypes exhibited spines in leaf. Nimbalkar and More (1980) reported that the presence or absence of spines was controlled by single gene, and was pleiotropic in action.

Among the several characters observed, wide range of variations for fruit shape *viz*., club shaped, ellipsoid, ovoid, obovate, globular, pear and cylindrical was observed. Nimbalkar and More (1980), Patil and More (1983) reported round shape was dominant over oval (pear and club shaped) fruit shape in brinjal. Among the genotypes studied, two brinjal accessions (Sm9, Sm13) exhibited stripes on its fruit skin. Twelve genotypes exhibited medium sized calyx while others showed either small or large size. Flesh density was compact for five genotypes and it was medium for rest (68.75%). High frequency of medium seediness of fruits (68.75%) was observed. Two genotypes observed to exhibit high seediness. Seediness is a character which is less preferred by the consumers. However, it is an important character for high seed multiplication ratio and in seed production. Among the characters studied, variation was found to exist for twelve characters whereas there was no variations for four characters viz., growth habit, stem pubescence, patches on fruits and leaf margin. Neha Rajan et al. (2020) analysed qualitative and quantitative characters in brinjal and reported that differences in morphological traits observed are due to varietal effect and environmental

conditions. Categorization of brinjal accessions based on morphological DUS characters were reported in Brinjal (Singh et al. 2023).

4. CONCLUSION

Protection of Plant Varieties and Farmers Right Act (PPVFRA) envisages characters of distinctness, uniformity and stability in the newly developed varieties which enables the protection of new varieties and registration of varieties for any specific novel traits. DUS characterization of brinjal germplasm revealed that there is ample genetic diversity prevails among germplasm for twelve qualitative traits *viz*., stem anthocyanin colour, leaf blade colour, leaf blade prickliness, flower colour, fruit shape, fruit colour, fruiting pattern, fruit stripes, fruit size of calyx, flesh density and seediness. These variations could be better utilized for crop identification and seed certification process. The present study documented the brinjal genetic resources which are under cultivation in these regions for further evaluation and utilization in crop improvement programs.

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