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, brinjal local types were collected and were 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 along the east coastal regions of Tamilnadu which are under cultivation in these regions for further evaluation and utilization in crop improvement programs.



*Key words*: Brinjal, DUS, descriptors, qualitative characters



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## 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 75 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). Precise morphological descriptions of cultivars have been found to be a proven and reliable strategy in identification and classification of crop varieties. 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. 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. 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

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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 |

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| | | | | |
|---|---|---|---|---|
| | | 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, prickliness of leaf blade was found to be absent and in 75% of the total germplasm it was present. 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 ration 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.

## 4. CONCLUSION

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Protection of Plant Varieties and Farmers Right Act (PPVFRA (2001)) 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.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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