Identification of Superior Brinjal Parents Based on Qualitative and Quantitative Traits

Md. Faruk Hossain, Kamal Uddin Ahmed, Md. Golam Azam and Md. Shafiqul Islam
PRC & RARS, Bangladesh Agricultural Research Institute, Ishwardi, Pabna, Bangladesh
Corresponding author: farukgolap@gmail.com

Abstract

Brinjal (*Solanum melongena* L.) is the second most important vegetable crop in Bangladesh. For maintaining a healthy germplasm and improvement of brinjal, it is important to document or characterize the existing local genotypes, landraces, cultivars or farmers' variety. Keeping in view the vast opportunity for improvement of brinjal local genotypes, the study was conducted at Regional Agricultural Research Station, BARI, Ishwardi, Pabna during 2017-18 to identify the important traits of brinjal accessions. A wide range of variation was found in different qualitative characters. Plant growth habit was upright for 20 accessions, intermediate for 5 accessions (17.94%) and prostrate for 11 accessions (30.56%). Fruit curvature was straight for 26 accessions (72.22%), slightly curved for 2 accessions (5.56%), and curved for 5 accessions (13.89%) and snake shaped for 3 accessions (8.33%). Fruit colour was green for 13 accessions (36.11%), milk white for 5 accessions (13.89%), scarlet red for 2 accessions (5.56%), lilac grey for 3 accessions (8.33%), purple for 8 accessions (22.22%), purple black for 3 accessions (8.33%) and black for 2 accessions (5.56%). Variations among brinjal genotypes were also observed in quantitative characters such as respect of days to first flowering, days to first edible fruiting stage, plant height, and number of fruits per plant, single fruit weight, fruit length, fruit breadth, fruit weight per plant and 100-seed weight. The highest single fruit weight (266.38 g) was recorded from SM Ish-001 and the lowest (77.65 g) from SM Ish-014. Fruit weight per plant was noted the highest (5.38 kg) was in SM Ish-015 followed by SM Ish-025 (5.05 kg), SM Ish-010 (4.98 kg) and SM Ish-027 (4.95 kg) while the lowest (2.09 kg) from SM Ish-032. These selected genotypes may be considered as superior accessions. Promising genotypes can be used as parents in future hybridization programs to develop high yield variety.

Introduction

- Brinjal (*Solanum melongena* L.) is typically cultivated in tropical and subtropical regions of the world (Sihachakr et al., 1994). But it is the second most important vegetable after potato in Bangladesh. It is a good source of vitamins and minerals. It is cultivated round the year.
- More than 60 varieties of brinjal including hybrids are cultivated in Bangladesh . In addition, a lot of landraces are cultivated all over the country. Systematic research such as collection, conservation, characterization and evaluation, and utilization of brinjal germplasm has been done at Bangladesh Agricultural Research Institute. One of the principal tools used for crop improvement is selection from indigenous germplasm; so far inclusive characterization of this crop has not been done. An evaluation of germplasm gives considerable data to organize the material. Germplasm collection, maintenance and its evaluation for economically important traits is a prerequisite for starting any breeding programme for the genetic improvement of the crop (Ansari et al., 2010).
- So, keeping in view the vast opportunity for improvement of brinjal local genotypes the research has been taken to evaluate and select the superior brinjal genotypes with respect to morphological and yield attributing characters.

Materials and Methods

- The experiment was conducted at Regional Agricultural Research Station, BARI, Ishwardi, Pabna during 2017-18 to characterize and evaluate brinjal genotypes.
- The experiment was laid out in a randomized completely block design (RCBD) with three replications. The genotypes were randomly distributed to each row within each line. The unit plot size was 7.50 cm X 0.70 m and 10 plants were accommodated in a plot with a plant spacing of 75 cm apart and row to row distance of 70 cm. Seeds were sown in nursery bed on 15 August 2017 and 40 days old seedlings were transplanted on 25 September 2017. Intercultural operation was done as per recommendation.
- Twenty five observations on qualitative (12) and quantitative (13) characteristics were classified into descriptor state as per descriptors for eggplant (IBPGR, 1990). Correlation heat map and PCA was analyzed using R statistical software. Cluster analysis, dendrogram and descriptive statistics were analyzed by STAR 2.0.1.

Results

- A wide range of variation was found in different qualitative characters among the 36 brinjal accession.

Plate 1. Plant growth habit: A-Upright, B-Intermediate and C-Prostrate

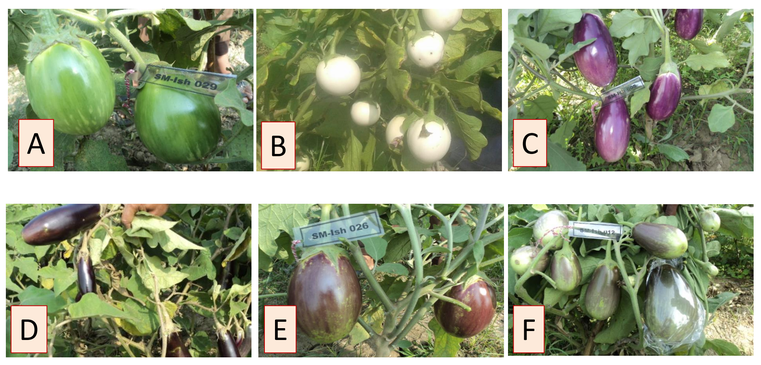

Plate 2. Different fruit colour- A:Green, B:Wgite, C:Purple, D:Black, E:Purple-black and F:Liliac-grey

- Quantitative characteristics of different brinjal accessions were presented in the Table 1. A comprehensive deviation was observed among the diverse characters under studied.

Table 1. Mean performance of yield and yield attributes of 36 brinjal germplasm

Characteristics	Range	Mean	SD	CV (%)
Days to first flowering	82-101	89.33	5.12	5.71
Days to first fruit harvest	102-132	114.86	7.73	6.73
Plant height (cm)	63-107	82.47	11.59	14.05
Plant breadth (cm)	48-134	92.50	14.81	16.02
No. of primary branches/plant	3.40-8.70	5.87	1.22	20.90
Fruit length (cm)	9.30-29.10	17.34	7.89	45.53
Fruit breadth (cm)	2.80-10.55	7.31	1.59	21.84
No. of fruits/plant	9-46	21.56	7.40	34.35
Single fruit wt. (g)	78-267	190	41.78	21.97
Yield per plant (kg)	2.09-5.38	3.87	0.83	21.56

Correlation study

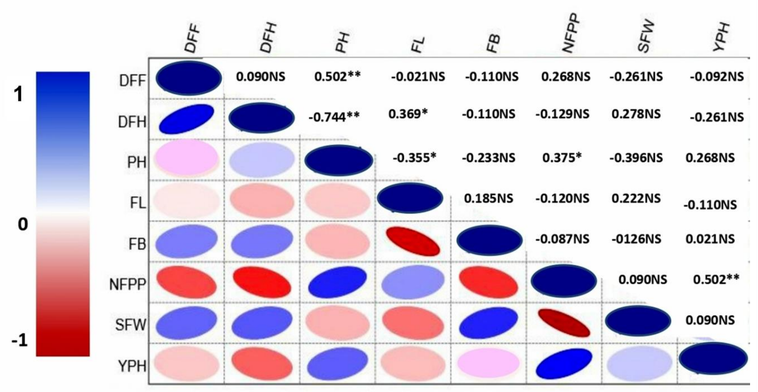

Figure 1 . Correlation coefficients (Pearson's) of 8 traits among 36 brinjal genotypes illustrated that yield was positively correlated with number of fruits per plant, plant height and single fruit weight.

Principal component analysis (PCA)

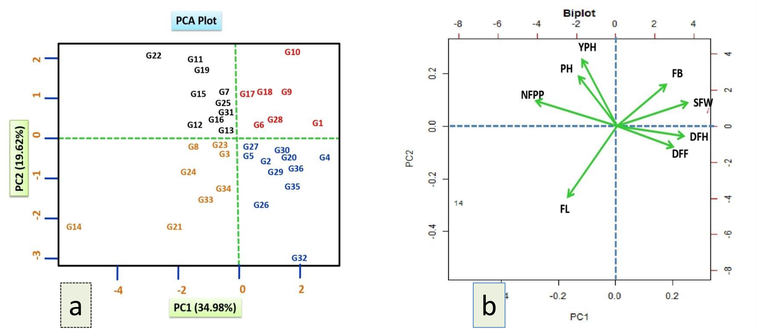

Figure 2. Principal component analysis (PCA) plot of various agronomic traits, yield, and yield-related traits in the brinjal genotypes. (**a**) Scatter plot of the various brinjal genotypes represented in two major principal component axes. (**b**) Grouping of the variables in two principal components.

Cluster analysis

- Thirty six brinjal accession were grouped into five cluster and mean performance of different quantitative characters were presented in Table 2.

Table 3. Means for quantitative characteristics of five clusters in brinjal genotypes

Cluster	DFF	DFH	PH	PB	NPB	FL	FB	NFPP	SFW	YPH
1	**95**	**123**	82	81	6.05	14.44	**7.85**	11.70	**212**	45.23
2	91	117	81	90	5.61	15.61	7.69	20.84	210	**82.09**
3	85	106	76	99	5.26	15.53	7.67	19.64	173	64.71
4	88	113	**101**	**102**	5.72	14.31	6.96	**29.48**	151	**82.26**
5	85	111	77	94	**7.88**	**23.06**	5.11	27.20	148	66.17

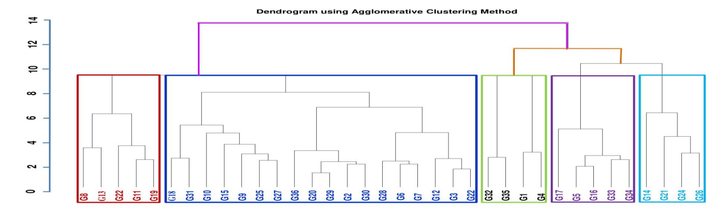

Fig. 3. Dendrogram showing the distribution of 36 brinjal genotypes

Conclusions

- Results of the present study indicated significant variation among the genotypes for all the characters studied.
- Based on the quantitative and qualitative traits and also genetic characters the accessions SM Ish-001, SM Ish-015, SM Ish-018, SM Ish-010, SM Ish-011, SM Ish-012, SM Ish-024 and SM Ish-027 gave high edible fruit weight per plant as well as yield per hectare and these may be considered as superior accessions. These accessions may be used in brinjal improvement program.

References

Ansari, S.F., Mehta, N., Ansari, S. and Gavel, J.P. (2011). Variability studies in Brinjal (*Solanum melongena* L.) in Chhattisgarh plains. *Electronic J. Plant Breed.*, 2(2): 275-281.

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Plate 3. High yielding brinjal accessions