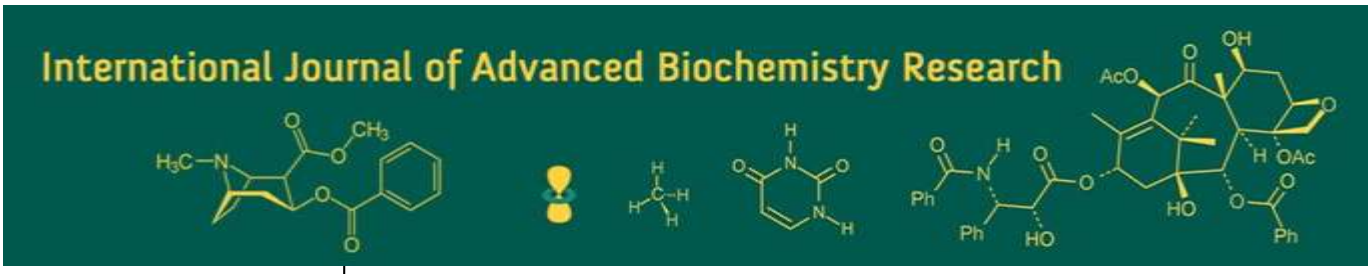

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Diksha Rathod
PG Student, Department of Vegetable Science, ASPEE College of Horticulture, NAU, Navsari, Gujarat, India

Twinkle Tandel
PG Student, Department of Vegetable Science, ASPEE College of Horticulture, NAU, Navsari, Gujarat, India

M Sarkar
Assistant Professor, College of Agriculture, NAU, Waghai (The Dangs), Gujarat, India

TR Ahlawat
Professor, Department of Fruit Science, ASPEE College of Horticulture, NAU, Navsari, Gujarat, India

AI Patel
Assistant Professor, Department of Vegetable Science, ASPEE College of Horticulture, NAU, Navsari, Gujarat, India

JM Vashi
Assistant Professor, Department of Vegetable Science, ASPEE College of Horticulture, NAU, Navsari, Gujarat, India

RP Bambharolia
Assistant Professor, College of Agriculture, NAU, Waghai (The Dangs), Gujarat, India

N Varshney
Assistant Professor, Department of Agricultural Statistics, N. M. College of Agriculture, NAU, Navsari, Gujarat, India

S Emmi
PG Student, Department of Vegetable Science, ASPEE College of Horticulture, NAU, Navsari, Gujarat, India

BN Chaudhari
Assistant Research Scientist, HMRS, NAU, Waghai (The Dangs), Gujarat, India

Corresponding Author:
M Sarkar
Assistant Professor, College of Agriculture, NAU, Waghai (The Dangs), Gujarat, India

Genetic variability analysis in brinjal (*Solanum melongena* L.)

Diksha Rathod, Twinkle Tandel, M. Sarkar, TR Ahlawat, AI Patel, JM Vashi, RP Bambharolia, N Varshney, S Emmi and BN Chaudhari

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Abstract
The research experiment was conducted to study genetic variability analysis for total 7 characters (5 quantitative and 2 bio-chemical) among 30 genotypes of brinjal (*Solanum melongena* L.). The investigation was conducted during *Rabi* season in the year 2021-22 at Rambhas Farm, Hill Millet Research Station, Navsari Agricultural University, Waghai, The Dangs, Gujarat, India. The study revealed high significant difference for most of the traits. Moderate GCV and PCV values were recorded for Average fruit weight (18.93%, 19.63%), Total no. of fruits per plant (18.47%, 19.51%), Total yield (16.62%, 17.80%) and Yield per plant (16.64%, 17.82%). It indicated that the extent of genetic variation observed was somewhat less for these characters among genotypes studied. High heritability coupled with high genetic advance were recorded for Average fruit weight (92.95%, 37.59%), Total no. of fruits per plant (89.67%, 36.04%), Total soluble solids (85.10%, 20.22%), Total yield (87.11%, 31.95%) and Yield per plant (87.15%, 32.00%) indicated that the characters were controlled by additive gene action and selection would be effective.

Keywords: Genetic variability, genetic advance, heritability, GCV, PCV, brinjal

Introduction
Brinjal (*Solanum melongena* L), also known as eggplant, is one of the most important solanaceous crops of sub-tropical and tropics. The name eggplant comes from the shape of its fruit, which is white and resembles the shape of chicken eggs. In Europe, it is also known as aubergine. According to cytological studies, the basic chromosome number of brinjal is 2n = 24. There is a large genetic variability in the indigenous material in terms of size, maturity and fruit shape, culinary characteristics and spinyness. The low yield level in India is due to a lack of crop genetic improvement and the development of promising genotypes. Brinjal needs constant genetic improvement. The greater the variability in the original material, the better the chances of evolving desired types. Having a good understanding of variability of different quantitative characteristics of the breeding materials will help the plant breeder to select superior genotypes based on their phenotype expression. Having considered all the above information, we have conducted the genetic variability analysis.

Materials and Methods
The proposed investigation was carried out during *Rabi* season in the year 2021-22 at Rambhas Farm, Hill Millet Research Station, Navsari Agricultural University, Waghai, The Dangs, Gujarat, India. The experiment consisted 30 genotypes laid out in Randomized Block Design (RBD) with three replications. 30-days-old seedlings were transplanted in 90 × 60 cm spacing. All the recommended agronomic package of practices was followed. Observations were recorded on the 5 randomly selected plants in each genotype. Observations were recorded for total 7 characters with respect to 5 quantitative and 2 bio-chemical parameters *viz*., plant height (cm), total no. of fruits per plant, average fruit weight (gm), total soluble solids (^{0} brix), vitamin C (mg 100 per g), yield per plant (kg) and total yield (t per ha), respectively during the period of experiment. Mean values of five plants from each plot were subjected to analysis of variance.

Results and Discussion
Analysis of Variations were observed among 30 genotypes of brinjal with respect to seven different vegetative, economic and biochemical parameters (Table 1). It indicated that mean square due to genotype were found to be significant for all traits and indicated presence of

sufficient amount of variability among the genotypes for fruit yield and its component traits. These findings are in general agreement with the findings of Nayak and Nagre (2013) [12], Ravali *et al*. (2017) [14], Verma *et al*. (2021) [19] and Chithra *et al*. (2022) [30]. Genetic coefficient of variation (GCV) was subtly lower than phenotypic coefficient of variation (PCV) which indicated mild effect of environment over all the characters (Table 2 and Figure 1). Moderate GCV and PCV values were recorded for Average fruit weight (18.93%, 19.63%), Total no. of fruits per plant (18.47%, 19.51%), Total yield (16.62%, 17.80%) and Yield per plant (16.64%, 17.82%). It indicated that the extent of genetic variation observed was somewhat less for these characters among genotypes studied. Low GCV and PCV values were recorded for Total soluble solids (10.64%, 11.53%) and Vitamin-C (9.29%, 9.83%). Moderate PCV and low GCV recorded for Plant height (11.19%, 9.28%). It indicated narrow genetic base among the genotypes for particular characters. High heritability was recorded for all the characters studied. High heritability coupled with high genetic advance were recorded for Average fruit weight (92.95%, 37.59%), Total no. of fruits per plant (89.67%, 36.04%), Total soluble solids (85.10%, 20.22%), Total yield (87.11%, 31.95%) and Yield per plant (87.15%, 32.00%) indicated that the characters were controlled by additive gene action and selection would be effective. Similar results reported by Divya and Sharma (2018) [4], Bende *et al*. (2019),) [1] Madhvi *et al*. (2015) [8], Patel *et al*. (2017) [13], Sangam *et al*. (2020) [15], Kumar *et al*. (2020) [6], Balas *et al*. (2019) [2], Jirankali *et al*. (2019) [5], Lokesh *et al*. (2013) [7], Mohanty (2002) [10], Solaimana *et al*. (2015) [17], Tiwari *et al*. (2018) [18], Vhankhande and Singh (2018) [20], Magar *et al*. (2019) [9], Shende *et al*. (2015) [16] and Solaimana *et al*. (2015) [17].

Table 1: Analysis of variance for various traits in brinjal

Source of variation	d. f.	Plant height (cm)	Average Fruit Weight (g)	Total no. of fruits per plant	Total soluble solids (^{0} brix)	Vitamin-C (100 mg/g)	Yield per plant (kg)	Total yield (t/ha)
Replication	2	112.99	7.63	17.25	0.81	0.43	0.04	16.14
Treatments	29	247.70**	348.59**	152.71**	1.05**	3.51**	0.36**	125.95**
Error	58	77.33	24.57	15.77	0.15	0.37	0.04	16.23
S. Em. ±	-	4.99	2.81	2.25	0.22	0.34	0.12	2.28
C.D at 5%	-	14.37	8.10	6.49	0.64	0.99	0.35	6.58

*, ** significant at 5% and 1% level respectively

Table 2: Genetic variability parameters for different characters in brinjal genotypes

Sr. No.	Characters	Mean	Range		Components of variance			GCV (%)	PCV (%)	h^2_{bs} (%)	GA	GAM (%)
			Min	Max	σ^2_g	σ^2_p	σ^2_e					
1	Plant height (cm)	81.47	54.60	109.98	56.78	82.56	25.77	9.28	11.19	68.78	12.87	15.85
2	Average fruit weight (g)	54.89	36.10	78.20	108	116.19	8.19	18.93	19.63	92.95	20.64	37.59
3	Total no. of fruits per plant	36.56	20.12	60.10	45.64	50.90	5.25	18.47	19.51	89.67	13.17	36.04
4	Total soluble solids (^{0}brix)	5.13	3.00	6.50	0.29	0.35	0.05	10.64	11.53	85.10	1.03	20.22
5	Vitamin-C (100 mg/g)	11.01	8.67	13.50	1.04	1.17	0.12	9.29	9.83	89.45	1.99	18.11
6	Yield per plant (kg)	1.96	0.93	2.72	0.10	0.12	0.01	16.64	17.82	87.15	0.62	32.00
7	Total yield (t/ha)	36.38	17.38	50.40	36.57	41.98	5.41	16.62	17.80	87.11	11.62	31.95

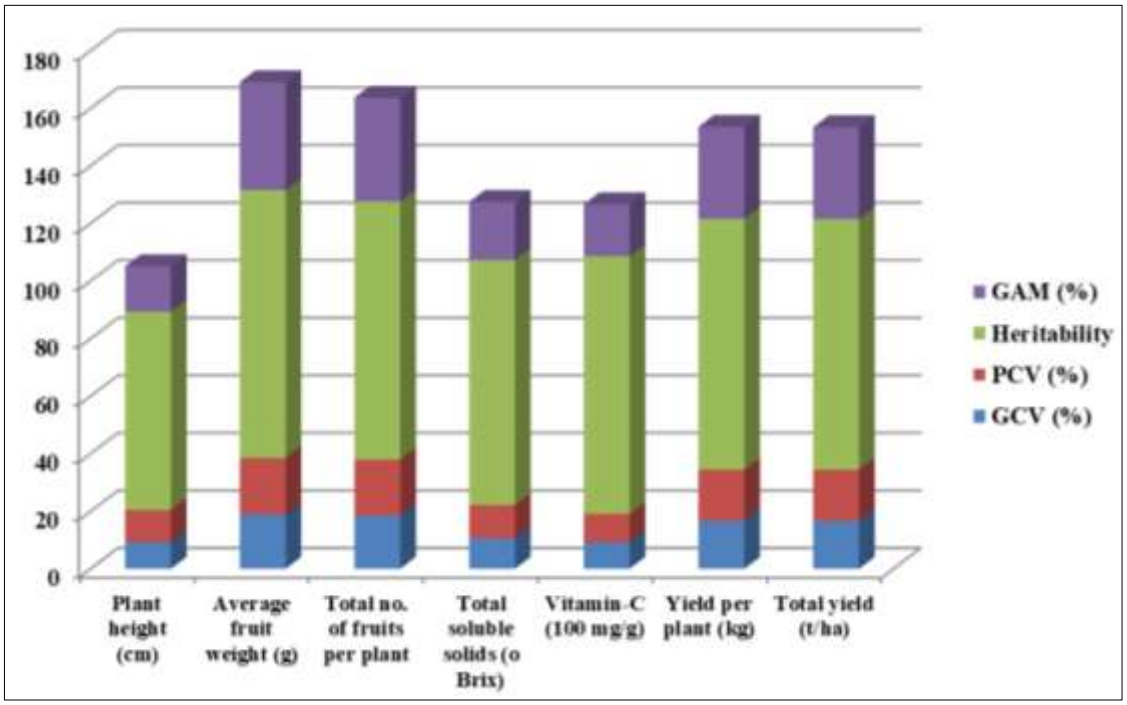

Fig 1: GCV (%), PCV (%), Heritability (%) and Genetic advance as percent of mean (GAM%) for different characters in brinjal genotypes

Conclusion

From the foregoing discussion we can conclude that significant amount of variability for all the different characters was observed. The assessment of genetic variability study revealed that more emphasis should be given to Average fruit weight, Total no. of fruits per plant, Total soluble solids, Total yield and Yield per plant due to their highest values in high heritability coupled with high genetic advance which indicated prevalence of additive gene action. Thus, selection would be effective tool for further improvement of those traits.

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