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Performance of brinjal genotypes for growth and yield under eastern Vidarbha condition

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Abstract
The present investigation entitled "Performance of brinjal genotypes for growth and yield under eastern vidarbha condition" was conducted during the summer season of 2024-2025 at the Research Farm, Horticulture Section, College of Agriculture, Nagpur. The objective of the study was to evaluate fourteen brinjal (*Solanum melongena* L.) genotypes, including a check variety (AKLB-9), for their growth and yield performance under eastern vidarbha agro-climatic conditions.
Significant variation was observed among the genotypes for key growth parameters such as plant height, plant spread, and number of primary branches at different stages (30, 60, and 90 days after transplanting). Genotype AKLB-9 recorded the highest plant height (68.64 cm at 90 DAT), while LBG-10 exhibited maximum plant spread (43.54 cm at 90 DAT) and the highest number of primary branches (10.01 at 90 DAT). In terms of yield attributing characters, LBG-10 emerged as the most promising genotype with the highest fruit yield per plant (1.76 kg), yield per plot (44.05 kg), and extrapolated yield per hectare (354.06 qha^{-1}), significantly outperforming the check and other genotypes. The observed variation in performance is attributed to the genetic makeup of the genotypes and their interaction with environmental factors. These findings suggest that LBG-10 holds great potential for commercial cultivation in Eastern Vidarbha during the summer season. The study also contributes valuable data for future breeding and selection programs in brinjal.

Keywords: *Solanum melongena* L., brinjal genotypes, Eastern Vidarbha, growth parameters, flowering behavior, fruit set, genetic variability, summer cultivation

Introduction
Brinjal (*Solanum melongena* L.), commonly known as eggplant, is an important solanaceous vegetable extensively cultivated in tropical and subtropical regions. India is considered the primary center of origin, while China serves as a secondary center. It is cultivated year-round across India, except at higher altitudes, due to its wide adaptability and nutritional significance. Brinjal is grown on approximately 0.73 million hectares in India, producing 12.80 million tonnes annually, with a national productivity of 17.06 tonnes/ha (Sharma and Banyal, 2016) [1]. Maharashtra contributes around 5% to the national brinjal production, with cultivation concentrated in districts such as Nagpur, Jalgaon, and Aurangabad.
Summer brinjal, locally known as Bhatai, is a regionally adapted landrace widely grown in Eastern Vidarbha and neighboring areas of Madhya Pradesh and Maharashtra. It is favored for its firm texture, mild flavor, and suitability for traditional dishes like bharli vangi and bharta. This genotype is well-suited for dryland cultivation on loamy to sandy soils under moderate irrigation, and it exhibits resilience against pests and environmental stress.
Brinjal also holds medicinal value. It is known to support liver function, lower cholesterol levels, and aid in managing diabetes, particularly the white-fruited variants (Dokane *et al*., 2016) [2]. When cooked in sesame oil, it is traditionally used for relief from toothaches. Additionally, the plant is used in rural regions as a source of fuel, and it is recognized in Ayurveda for its cardio-tonic and aphrodisiac properties (Chadha, 1993) [3].
Given its economic and therapeutic importance, improving brinjal yield through selection of well-adapted and high-performing genotypes is critical. Traits such as plant height, spread, number of primary branches, flowering behavior, and fruit set directly influence yield(Kumar *et al*., 2011) [4]. Assessing the performance of local genotypes under specific agro-climatic conditions is necessary to guide varietal selection and ensure food security through

sustainable crop improvement.

Brinjal is a nutritionally important crop, rich in proteins, vitamins, and minerals, and holds medicinal value in traditional systems for managing diabetes, liver ailments, and cardiovascular health. Agronomic traits such as plant height, spread, flowering behavior, and fruit set play a crucial role in yield optimization. Given the increasing pressure to improve food production under climate variability, evaluating regional genotypes for their adaptability and productivity is essential. Therefore, the present study aims to assess the growth and flowering performance of diverse summer brinjal genotypes under the agro-climatic conditions of Eastern Vidarbha to identify promising lines for cultivation and crop improvement.

Materials and Methods

Experimental details

1. **Name of crop:** Brinjal
2. **Botanical name:** Solanum melongena L.
3. **Family:** Solanaceae
4. **Year of experiment:** 2024-2025
5. **Experimental Design:** RBD (Randomized Block Design)
6. **Number of treatments:** 14 Genotypes (13 local genotypes + 1 standard check)
7. **Number of replications:** 03
8. **Total number of plots:** 42
9. **Transplanting time:** December-2024
10. **Spacing:** 60 cm x 45 cm
11. **Plot size**
    - **Gross Area:** 544.32 m2
    - **Net Area:** 323.82 m2
12. **Plant population plot-1:** 30
13. **Layout:** Ridges and furrows

Treatment Details

Treatment	Genotypes	Source
T_1	LBG-1	Somalwada (lakhani)
T_2	LBG-2	Mendha
T_3	LBG-3	Lakhori
T_4	LBG-4	Khedepar
T_5	LBG-5	Pohara
T_6	LBG-6	Rengepar
T_7	LBG-7	Salebhata
T_8	LBG-8	Gadegaon
T_9	LBG-9	Virshi (sakoli)
T_{10}	LBG-10	Kinhi
T_{11}	LBG-11	Keshalwada
T_{12}	LBG-12	Gunthara
T_{13}	LBG-13	Morgoan
T_{14}	AKLB-9 (Check)	Department of Vegetable Science, Dr. PDKV, Akola

Growth parameters

Plant height (cm)

Using a meter scale, the height of the five randomly chosen plants that had previously been tagged was measured in centimetre's at 30, 60 and 90 days following transplantation. The average of five plants was determined by measuring the vertical distance between ground level and the leaf's highest growing point. Replication-wise and treatment-wise means were calculated.

Plant spread (cm)

At 30, 60, 90 and the last harvest, the plant's spread was measured concurrently with its height in both east-west and north-south directions.

Number of primary branches plant^{-1}

Number of branches arising from the main stem and primary branches above the ground level at final harvest were counted and expressed as number of primary branches.

Yield parameters

Yield plant^{-1}

Harvested fruits at each harvesting from each observational plant were weighed on electronic scale and total weight was calculated by summing up the weight of fruits plant^{-1} and stated in kilogram.

Yield plot^{-1} (kg)

The mean values of flowers obtained plot^{-1} from all pickings were determined in kilograms and the fruit from each plot was harvested and counted according to treatment.

Yield hectare^{-1} (q)

The weight of fruit hectare^{-1} in quintals was calculated by counting the weight of the fruits from each plot according to treatment and then multiplying that weight by the hectare factor.

Results and Discussion

Growth Parameters

Plant Height

Plant height increased steadily across all genotypes over time. At 90 DAT, AKLB-9 (T14) exhibited the highest plant height (68.64 cm), followed by LBG-10 (66.17 cm), whereas LBG-6 recorded the lowest (44.24 cm). These differences can be attributed to inherent genetic potential and genotype-environment interactions.

These findings are in agreement with the earlier works of Dahatonde *et al*. (2010) [5], who also reported significant varietal differences in brinjal plant height under different agro-climatic zones.

Plant Spread

The spread of brinjal plants increased with age. At 90 DAT, LBG-10 (43.54 cm) and LBG-11 (42.29 cm) showed maximum plant spread, while LBG-6 had the minimum (29.58 cm). Wider spread can be attributed to the more vigorous growth habit and higher photosynthetic surface area of those genotypes.

These results corroborate the findings of Bhambure (2016) [6], who demonstrated that plant spread is largely influenced by the genotype and environmental adaptability.

Number of Primary Branches Plant^{-1}

At 90 DAT, LBG-10 recorded the highest number of branches (10.01), significantly superior to other genotypes, suggesting better canopy structure for optimal yield. LBG-6 again showed the least value (7.12). These results align with those of Shinde *et al.* (2012) [7], who emphasized the influence of genotype on branching pattern in brinjal.

Fruit yield plant^{-1}

Fruit yield plant^{-1} is important character as it directly influences the yield of the crop. Its exhibited significant difference in number of fruits yield plant^{-1} in brinjal genotype and was in the range of 0.46 to 1.76 with average mean of 1.11. The highest fruit yield plant^{-1} in LBG-10 (1.76) which was at par with LBG-1 (1.55) was superior

over rest of the genotypes. The lowest number of fruits plant^{-1} was observed in genotype LBG-6 (0.46). The results were in agreement with the findings of Magar (2014) [8] in brinjal.

Fruit yield plot^{-1}

The data observed for yield plot^{-1} for different brinjal genotypes under study. The fruit yield plot^{-1} of brinjal genotype was in the range of LBG-6 (11.52 Kg) to LBG-10 (44.05 Kg) with average mean of fruit yield plot^{-1} 27.91 Kg. The highest fruit yield plot^{-1} was observed in LBG-10 (44.05 Kg) which was found at par with genotype LBG-1 (38.86 kg) and LBG-11(37.96). Whereas, lowest fruit yield plot^{-1} in genotype LBG-6 (11.52 Kg).

Fruit yield hectare^{-1}

The data regarding variation in yield hectare^{-1} observed in fourteen genotypes of brinjal are reported. Data obtained for yield hectare^{-1} revealed that the genotype LBG-10 produced maximum yield (354.06 q), while minimum yield hectare^{-1} (92.58 q) reported from genotype LBG-6. Variation in yield was noticed due to genetic constitution of plant and interaction with environment. The results were in agreement with the findings of Gogoi *et al*. (2018) [9] in brinjal.

The highest yield was obtained from LBG-10 (354.06 q/ha), followed by LBG-1 (312.34 qha^{-1}) and LBG-11 (305.16 qha^{-1}). The genotype LBG-6 exhibited the lowest yield at 92.58 qha^{-1}. The average yield across genotypes was approximately 241.79 qha^{-1}, suggesting that top-performing genotypes could significantly enhance commercial brinjal production. These observations align with previous studies by Gogoi *et al*. (2018) [9], confirming that genetic makeup and environmental interaction significantly influence yield attributes.

Table 1: Plant height of brinjal genotypes

Treat. No.	Genotypes	Plant height (cm)		
		30 DAT	60 DAT	90 DAT
T_1	LBG-1	19.72	40.02	57.22
T_2	LBG-2	20.32	38.52	52.57
T_3	LBG-3	13.18	34.05	48.44
T_4	LBG-4	13.92	32.12	50.71
T_5	LBG-5	15.85	34.05	46.17
T_6	LBG-6	12.72	30.92	44.24
T_7	LBG-7	18.58	36.78	50.31
T_8	LBG-8	20.31	40.13	63.75
T_9	LBG-9	17.23	37.12	49.17
T_{10}	LBG-10	24.55	47.18	66.17
T_{11}	LBG-11	22.70	45.25	62.68
T_{12}	LBG-12	22.98	41.18	55.33
T_{13}	LBG-13	20.10	39.92	55.91
T_{14}	AKLB-9 (Check)	25.98	50.78	68.64
	F test	NS	Sig	Sig
	SE (m)±	4.56	2.64	3.00
	CD at 5%	-	7.66	8.71

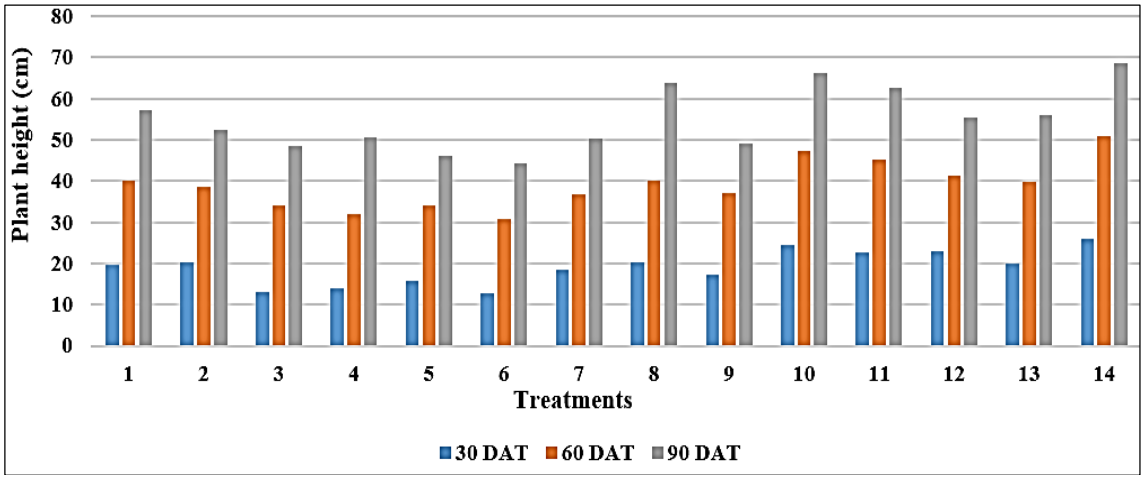

Fig 1: Plant height of brinjal genotypes

Table 2: Plant spread of brinjal different

Treat. No.	Genotypes	Plant spread (cm)		
		30 DAT	60 DAT	90 DAT
T_1	LBG-1	18.88	33.94	42.10
T_2	LBG-2	16.86	30.62	38.87
T_3	LBG-3	12.53	30.41	38.65
T_4	LBG-4	10.46	27.50	35.74
T_5	LBG-5	12.30	29.43	36.05
T_6	LBG-6	8.93	21.33	29.58
T_7	LBG-7	10.73	26.77	35.01
T_8	LBG-8	18.08	33.80	41.50
T_9	LBG-9	13.85	30.81	39.06
T_{10}	LBG-10	21.09	35.29	43.54
T_{11}	LBG-11	19.20	34.04	42.29
T_{12}	LBG-12	16.93	30.28	38.52
T_{13}	LBG-13	17.06	30.49	38.73
T_{14}	AKLB-9 (Check)	18.46	33.85	42.05
	F test	NS	Sig	Sig
	SE (m)±	3.04	1.28	1.24
	CD at 5%	-	3.72	3.60

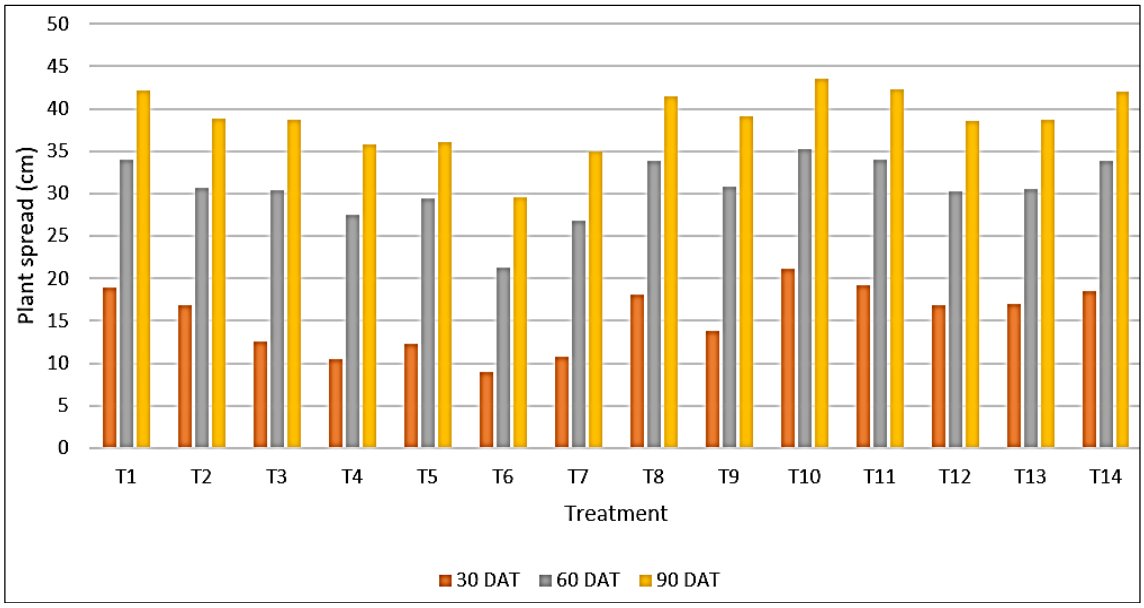

Fig 2: Plant spread of brinjal genotypes

Table 3: Number of primary branches plant^{-1} of brinjal genotypes

Treat. No.	Treatments	Number of primary branches plant^{-1}		
		30 DAT	60 DAT	90 DAT
T_1	LBG-1	2.53	8.31	9.13
T_2	LBG-2	2.77	7.62	8.59
T_3	LBG-3	1.88	7.23	7.93
T_4	LBG-4	1.67	7.31	8.06
T_5	LBG-5	2.47	7.13	7.70
T_6	LBG-6	2.03	5.48	7.12
T_7	LBG-7	1.33	7.62	8.17
T_8	LBG-8	2.13	7.84	8.54
T_9	LBG-9	1.83	7.30	7.97
T_{10}	LBG-10	1.83	8.80	10.01
T_{11}	LBG-11	2.07	8.11	9.03
T_{12}	LBG-12	1.93	7.66	8.49
T_{13}	LBG-13	1.78	7.43	8.17
T_{14}	AKLB-9 (Check)	1.80	8.03	8.57
	F test	NS	Sig	Sig
	SE (m)±	0.50	0.26	0.35
	CD at 5%		0.76	1.01

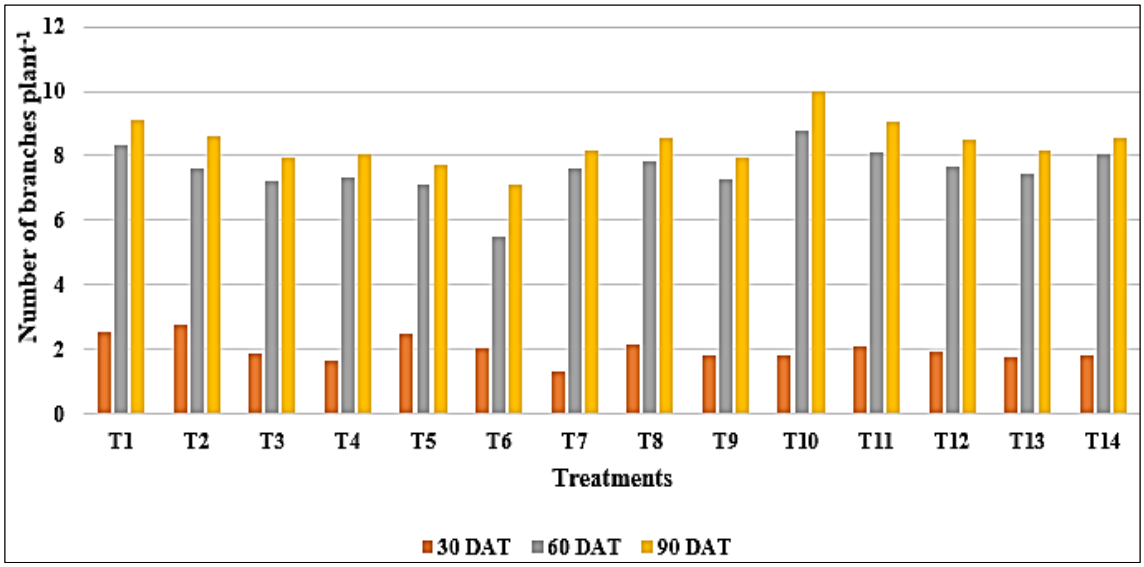

Fig 3: Number of primary branches plant^{-1} of brinjal genotypes

Table 4: Fruit yield plant^{-1}, yield plot^{-1} and yield ha^{-1} of brinjal genotypes

Treat. No.	Treatments	Yield plant^{-1} (Kg)	Yield plot^{-1} (Kg)	Yield hectare^{-1} (q)
T_1	LBG-1	1.55	38.86	312.34
T_2	LBG-2	1.16	28.95	232.71
T_3	LBG-3	1.05	26.16	210.30
T_4	LBG-4	1.20	30.04	241.48
T_5	LBG-5	0.97	24.34	195.63
T_6	LBG-6	0.46	11.52	92.58
T_7	LBG-7	0.54	13.51	108.61
T_8	LBG-8	1.25	31.36	252.11
T_9	LBG-9	0.86	21.50	172.83
T_{10}	LBG-10	1.76	44.05	354.06
T_{11}	LBG-11	1.51	37.96	305.16
T_{12}	LBG-12	1.00	24.96	200.62
T_{13}	LBG-13	0.94	23.45	188.49
T_{14}	AKLB-9 (Check)	1.37	34.21	274.99
	F test	Sig	Sig	Sig
	SE (m)±	0.08	2.12	17.03
	CD at 5%	0.25	6.16	49.51

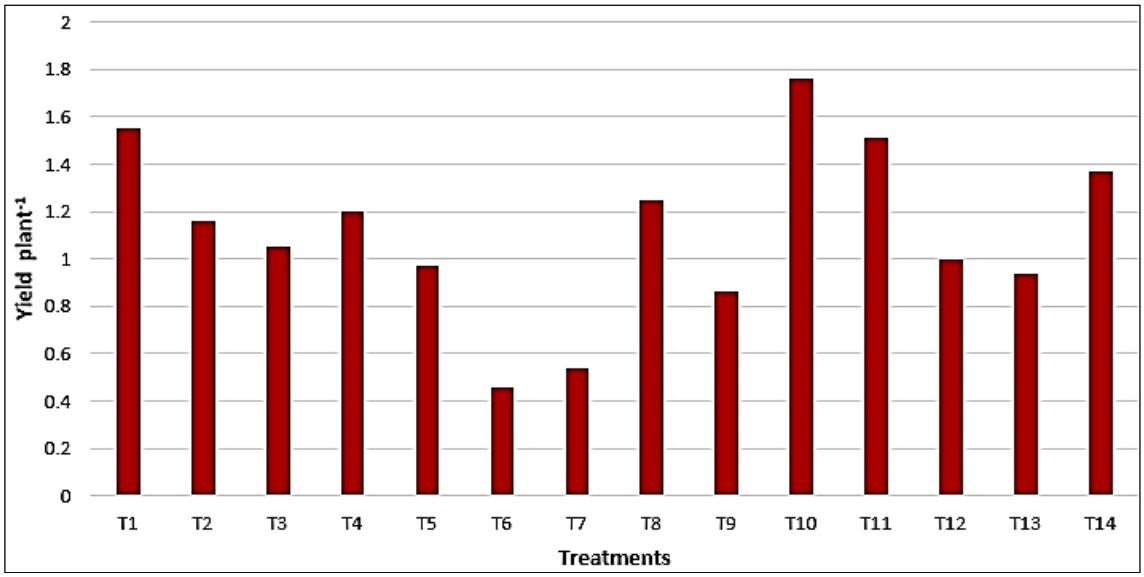

Fig. 4: Yield per plant of brinjal genotypes

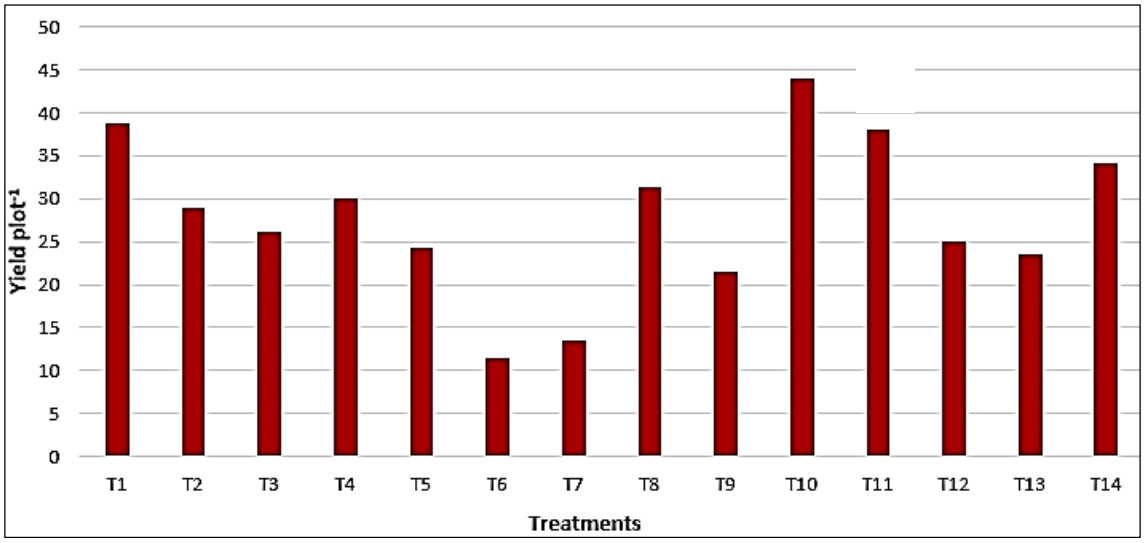

Fig 5: Fruit yield plot^{-1} of brinjal genotypes

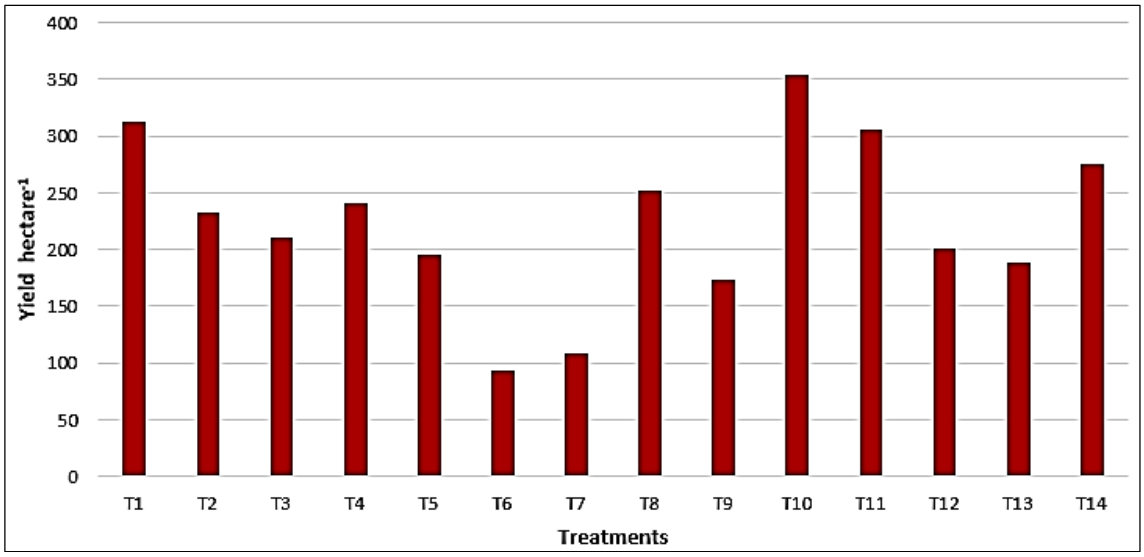

Fig 6: Fruit yield hectare^{-1} of brinjal genotypes

Conclusion

The present investigation on fourteen genotypes of brinjal revealed significant variation in growth and yield parameters. Among all the genotypes studied, LBG-10 consistently outperformed others across multiple traits, including plant height (66.17 cm), plant spread (43.54 cm), number of primary branches per plant (10.01), fruit yield per plant (1.76 kg), yield per plot (44.05 kg), and yield per hectare (354.06 q/ha). This superior performance can be attributed to the inherent genetic potential and favourable genotype-environment interactions.

In contrast, LBG-6 recorded the lowest values across nearly all parameters, highlighting its comparatively poor adaptability and productivity. Other promising genotypes such as LBG-1 and LBG-11 also showed encouraging results, suggesting their potential suitability for high-yielding cultivation.

The study underscores the importance of genotype selection in enhancing brinjal production and indicates that LBG-10 can be a recommended variety for commercial cultivation under similar agro-climatic conditions. Future research may focus on multi-location trials and the evaluation of other agronomic and resistance traits to further substantiate these findings.

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