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Development of new long brinjal variety GLB 11 in Gujarat state

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Abstract

A Brinjal variety GLB-11 (JBL 19-02) was developed at Vegetable Research Station, Junagadh Agricultural University, Junagadh and was evaluated under state and coordinated trials during 2019-20 to 2023-24 and 2021-22 to 2023-24, respectively, during late kharif season at various locations along with check varieties; GJLB-4, GAB-6 and Punjab Sadabahar. On the basis of mean fruit yield of 440.2 q/ha, which was 12.0% higher than the check variety GJLB-4 (393.0 q/ha) under 11 testing trials, whereas, in 9 testing trials this variety has recorded 438.4 q/ha fruit yield, which was 12.4 and 20.8% higher than the check varieties GAB-6 (390.2 q/ha) and Punjab Sadabahar (362.9 q/ha), respectively. Fruits are medium in size with medium long. Fruit pulp is white with less number of seeds. Fruits are pinkish in colour with extra-long peduncle and good shining. Plant is tall with erect type habit. Total soluble sugar (3.32%), total soluble solids (6.00% Brix) and total phenol (0.32%) are less to check varieties GJLB-4, GAB-6 and Punjab Sadabahar. Incidence little leaf, jassids and fruit borer damage, this variety was found superior than check varieties GJLB-4, GAB-6 and Punjab Sadabahar.

Keywords: Development, long, brinjal variety, Gujarat, GLB-11, Punjab Sadabahar, GJLB-4, GAB-6

Introduction

Brinjal or eggplant, popularly known as brinjal or aubergine (*Solanum melongena* L.) is among the extensively cultivated vegetables having chromosome number $2n=2x=24$. It is self-pollinated crop belonging to the family *Solanaceae*. The name brinjal is popular in Indian subcontinents and is derived from Arabic and Sanskrit words, whereas, the name eggplant has been derived from the shape of the fruit of some varieties, which are white and resemble in shape to chicken eggs. Eggplant is a day neutral plant grown throughout the year, is a common and popular vegetable crop in the subtropics and tropics mainly for its immature fruits as vegetables. It is known by different names like Begun (Bengali), Ringna (Gujarati), Baingan, (Hindi), Vange (Marathi), Baigan (Oriya), Vashuthana (Malayalam), Kathiri (Tamil), Venkaya and Abhala (Sanskrit). A large number of cultivars differing in size, shape and colour of fruits are grown in India. The combining ability analysis helps in the evaluation of inbreeds in terms of their genetic value, and in the selection of suitable parents for hybridization. It also helps in the identification of superior cross combinations which may be utilized for commercial exploitation of heterosis. Consequently, it is also referred to as the common man's vegetable in the Indian subcontinent owing to its year-around availability (Saini *et al.* 2019) [4]. Among brinjal

producers; China, India, Japan and Turkey are the four major countries. China is the world's top eggplant grower, accounting for more than half of world acreage and India stands second, with about one quarter of the world total production by India. In India during 2022-23, Brinjal acreage was 6,81,000 hectare with 1,29,72,000 metric tones production. Gujarat sown an area of 81,673 hectare under brinjal cultivation and a production of 16, 24,682 metric tones. Gujarat contributes 9.60 and 10.40% shares of brinjal in total area and production, respectively. Brinjal secured third rank after potato, okra and onion in area and production in Gujarat.

The major districts of Gujarat growing brinjal are Vadodara, Banaskantha, Junagadh, Surat, Bhavnagar, Tapi, Kheda, Anand, Surendranagar, Rajkot, Amreli and Gandhinagar occupied more than 75% area and more than 77% production of total brinjal crop.

Materials and Methods

Brinjal variety GLB-11 was developed by hybridization between GJB-2 x JBL-10-15 followed by pedigree method of selection. This genotype was tested as an entry in PET during 2019-20 and onwards at multiplications trials in LSVT in the state from the year 2021-22 to 2023-24. This genotype was also tested in AICRP (VC) from 2021-22 to 2023-24. Because of its good performance in state trials, the

entry GLB-11 was tested under All India Coordinated vegetable Research Project – from 2012-13 to 2017-18 at different locations in India.

Results and Discussion

The results on fruit yield of GLB-11 was evaluated at Junagadh, Anand, Waghai and Ladol centers during late kharif/rabi from 2019-20 to 2023-24 at different state level varietal testing trials along with the check varieties; GJLB-4, GAB-6 and Punjab Sadabahar. This variety was recorded mean fruit yield of 440.2 q/ha, which was 12.0% higher than the check variety GJLB-4 (393.0 q/ha) under 11 testing trials, whereas, in 9 testing trials this variety has recorded 438.4 q/ha fruit yield, which was 12.4 and 20.8% higher than the check varieties GAB-6 (390.2 q/ha) and Punjab Sadabahar (362.9 q/ha), respectively (Table 1).

Looking to the zone wise yield data, it can be concluded that the genotype GLB-11 performed better on all the zones except North Gujarat as compared to check varieties GJLB-4, GAB-6 and Punjab Sadabahar.

In South Saurashtra Agro-climatic zone (Junagadh), GLB-11 recorded higher mean fruit yield of 473.9 q/ha, and 491.1 q/ha, which was 25.2%, 39.8% and 41.7% higher over check varieties; GJLB-4 (378.5 q/ha), GAB-6 (351.4 q/ha) and Punjab Sadabahar (346.7 q/ha), respectively (Table-2)

In Middle Gujarat Agro-climatic zone (Anand) GLB-11 was higher fruit yield (479.3 q/ha), which was 17.2%, 6.3% and 23.7% higher over check varieties GJLB-4 (409.0 q/ha), GAB-6 (451.0 q/ha) and Punjab Sadabahar (387.3 q/ha) (Table-2).

In North Gujarat Agro-climatic zone (Ladol), this variety registered higher mean fruit yield of (334.1 q/ha) which was 2.1% higher over check variety Punjab Sadabahar (327.1 q/ha) (Table-2).

In South Gujarat Agro-climatic zone (Waghai), GLB-11 was higher fruit yield (366.4 q/ha) which was 11.8% and 10.0% higher over the check varieties GJLB-4 (327.8 q/ha) and GAB-6 (333.1 q/ha) respectively (Table-2). Shymal, Hisar Pragati, Pusa Anmol and Pusa Uttam are the important varieties of brinjal (Baswana and Dharmveer Duhan, 2002) [2].

This genotype JBL 19-02 (GLB-11) was evaluated under All-India Co- Ordinated Varietal Trial under IET during 2021-22. It has been promoted in AVT-I during 2022-23 and evaluated in AVT-II during 2023-24. Fruits are medium in size with medium long. Fruit pulp is white with less number of seeds. Fruits are pinkish in colour with extra-long peduncle and good shining. Plant is tall with erect type habit. Average fruit length, girth and weight of this variety was 14 cm, 4 cm. and 85 gm respectively (Table 3).

This variety showed was found comparable to all check varieties against little leaf disease and The jassids population and percent shoot & fruit borer damage were comparable to check varieties, while the whitefly population was found low as compared to check varieties. (Table-4&5). The results are supported by the work Rathod *et al.* (2017) [5].

The qualitative parameters of GLB-11 were comparatively lower than GJLB-4, GAB-6 and Punjab Sadabahar. The fruits of this variety had lower total soluble sugar (3.32%) and total phenol (0.32%) compared to 3.95%, 4.30% and 4.10% and 0.47%, 0.79% and 0.44% GJLB-4, GAB-6 and Punjab Sadabahar respectively (Table 6), however, Moisture of GLB-11 (93.47%) was higher than check varieties GJLB-4 (92.57%), GAB-6 (91.36%) and Punjab Sadabahar (93.33%). These results are in agreement with the findings of Rathod *et al.* (2017) [5].

Recommendation for the farmers in Gujarat state

The farmers of Gujarat state growing the brinjal crop during late kharif /rabi season are recommended to grow brinjal variety Gujarat Long Brinjal- 11 (GLB-11: Sorath Priya). The variety has recorded a mean fruit yield of 440 q/ha, which was 12.0, 12.4 and 20.8 per cent higher over check varieties viz., GJLB-4 (393 q/ha), GAB-6 (390 q/ha) and Punjab Sadabahar (363 q/ha), respectively. The fruits of GLB-11 are medium in size with a medium long shape and pinkish in colour with good shining. This variety was found comparable to all check varieties against little leaf disease. Whitefly population was found low as compared to check varieties.

Table 1: Year-wise seed yield performance of Brinjal variety JBL-19-02 (GLB-11) at different locations of Gujarat state under state level trials

Year	Name of Trial	Locations	Fruit yield (q/ha)				S. Em. ±	CD at 5%	CV %
			GLB-11	Checks					
				GJLB- 4 (SC) (a)	GAB- 6 (SC) (b)	Punjab Sadabahar (NC) (c)			
2019-20	PET	Junagadh	428.4	393.4	-	-	16.9	50.3	7.4
% increase over			-	8.90	-	-	-	-	-
2020-21	SSVT	Junagadh	467.8 ^a	376.1	-	-	20.6	62.4	8.7
% increase over			-	24.38	-	-	-	-	-
2021-22	LSVT	Anand	439.8	421.8	424.4	390.4	21.2	69.0	8.7
		Junagadh	509.6 ^{abc}	390.1	349.8	356.9	22.8	67.7	7.2
		Waghai [#]	272.3	333.5	364.2	327.1	17.3	50.8	10.7
		Ladol [#]	155.8	167.4	154.9	170.1	13.1	36.4	12.9
Mean (2)			474.7	405.9	387.1	373.7	-	-	-
% increase over			-	16.9	22.6	27.0	-	-	-
2022-23	LSVT	Anand	509.3 ^{ac}	411.5	460.4	398.7	22.2	65.9	9.0
		Junagadh	478.9 ^{bc}	393.3	385.4	374.7	31.0	92.1	7.1
		Waghai [#]	265.7	307.4	294.7	297.8	10.8	32.2	6.8
		Ladol	309.9	406.0	389.9	303.6	28.8	85.0	12.2
Mean (3)			432.7	403.6	411.9	359.0	-	-	-
% increase over			-	7.2	5.0	20.5	-	-	-
2023-24	LSVT	Anand	488.7 ^{ac}	393.5	468.1	372.9	25.7	76.2	10.7
		Junagadh	485.0 ^{abc}	339.8	318.8	308.6	33.5	99.6	8.1

		Waghai	366.4	327.8	333.1	409.3	16.6	49.4	8.3
		Ladol	358.4	470.5	382.1	350.5	26.3	78.0	11.5
Mean (4)			424.6	382.9	375.5	360.3	-	-	-
% increase over			-	10.9	13.1	17.8	-	-	-
Overall Mean (11)			440.2	393.0	-	-	-	-	-
% increase over			-	12.0	-	-	-	-	-
Overall Mean (9)			438.4	-	390.2	362.9	-	-	-
% increase over			-	-	12.4	20.8	-	-	-
No. of frequency in top non-significant group			6/11	5/11	3/9	5/9	-	-	-

Note: * a, b & c indicates statistically superior than GJLB-4, GAB-6 & Punjab Sadabahar, respectively

Data were not considered due to below state average fruit yield

Table 2: Seed yield performance of Brinjal variety JBL-19-02 (GLB-11) in the different zones/regions of Gujarat state

Year	Name of Trial	Locations	Fruit yield (q/ha)				S.Em. ±	CD at 5%	CV %
			GLB-11	GJLB- 4 (SC) (a)	GAB- 6 (SC) (b)	Punjab Sadabahar (NC) (c)			
Saurashtra Agro-climatic Zone									
2019-20	PET	Junagadh	428.4	393.4	-	-	16.9	50.3	7.4
2020-21	SSVT	Junagadh	467.8 ^a	376.1	-	-	20.6	62.4	8.7
2021-22	LSVT	Junagadh	509.6 ^{abc}	390.1	349.8	356.9	22.8	67.7	7.2
2022-23	LSVT	Junagadh	478.9 ^{bc}	393.3	385.4	374.7	31.0	92.1	7.1
2023-24	LSVT	Junagadh	485.0 ^{abc}	339.8	318.8	308.6	33.5	99.6	8.1
Overall Mean (5)			473.9	378.5	-	-	-	-	-
% increase over			-	25.2	-	-	-	-	-
Overall Mean (3)			491.1	-	351.4	346.7	-	-	-
% increase over			-	-	39.8	41.7	-	-	-
Middle Gujarat Zone									
2021-22	LSVT	Anand	439.8 ^c	421.8	424.4	390.4	21.2	69.0	8.7
2022-23	LSVT	Anand	509.3 ^{abc}	411.5	460.4	398.7	22.2	65.9	9.0
2023-24	LSVT	Anand	488.7 ^{abc}	393.5	468.1	372.9	25.7	76.2	10.7
Overall Mean (3)			479.3	409.0	451.0	387.3	-	-	
% increase over				17.2	6.3	23.7	-	-	
North Gujarat Zone									
2021-22	LSVT	Ladol#	155.8	167.4	154.9	170.1	13.1	36.4	12.9
2022-23	LSVT	Ladol	309.9	406.0	389.9	303.6	28.8	85.0	12.2
2023-24	LSVT	Ladol	358.4	470.5	382.1	350.5	26.3	78.0	11.5
Overall Mean (2)			334.1	438.3	386.0	327.1	-	-	
% increase over			-	-	-	2.1	-	-	
South Gujarat Zone									
2021-22	LSVT	Waghai#	272.3	333.5	364.2	327.1	17.3	50.8	10.7
2022-23	LSVT	Waghai#	265.7	307.4	294.7	297.8	10.8	32.2	6.8
2023-24	LSVT	Waghai	366.4	327.8	333.1	409.3	16.6	49.4	8.3
Overall Mean (1)			366.4	327.8	333.1	409.3	-	-	
% increase over			-	11.8	10.0	-	-	-	

Note: * a, b & c indicates statistically superior than GJLB-4, GAB-6 & Punjab Sadabahar, respectively

Data were not considered due to below state average fruit yield

Table 3: Description of the variety along with check

Sr. No.	Ancillary observations	GLB-11	Checks		
			GJLB-4 (SC)	GAB-6 (SC)	Punjab Sadabahar (NC)
1	Days to 50% flowering	57 (51-62)	64 (58-67)	68 (60-71)	61 (55-64)
	Plant height (cm)	130	80	89	83
2		(111-167)	(54-106)	(71-114)	(68-112)
	Plant spread (cm)	59	70	68	73
3		(54.00-63.33)	(65.00-75.22)	(62.78-70.00)	(61.11-74.28)
	No. of branches/plant	3	3	3	3
4		(2.55-3.23)	(1.88-3.66)	(2.22-3.77)	(2.77-3.89)
	Fruit length (cm)	14	14	12	17
5		(11.18-19.61)	(11.77-14.97)	(10.1-16.78)	(15.90-18.22)
	Fruit girth (cm)	4	4	4	3
6		(3.10-5.46)	(3.53-5.48)	(2.60-6.90)	(2.77-5.60)
	Fruit weight (g)	85	91	55	70
7		(64.70-112.33)	(53.67-128.83)	(41.67-80.71)	(65.80-75.07)
8	No. of fruits/plant	30	19	38	25
		(26-35)	(16-22)	(27-47)	(22-31)

Table 4: Reaction to major diseases recorded from 2021-22 to 2023-24

Disease	Year	Incidence (%)							
		GLB-11		Checks					
				GJLB-4 (SC)		GAB-6 (SC)		Punjab Sadabahar (NC)	
		A	B	A	B	A	B	A	B
Little leaf (%) (Junagadh)	2021-22	3.77	R	2.06	R	0.00	F	1.85	R
	2022-23	0.00	F	1.92	R	0.00	F	9.26	R
	2023-24	0.00	F	0.00	F	0.00	F	0.00	F
	Range	0.00-3.77	-	0.00-2.06	-	0.00-0.00	-	0.00-9.26	-
Little leaf (%) (Anand)	2021-22	5.00	R	5.50	R	0.00	F	5.00	R
	2022-23	5.50	R	3.00	R	1.00	R	5.00	R
	2023-24	0.00	F	12.50	MR	0.00	F	18.20	MR
	Range	0.00-5.50	-	3.00-12.50	-	0.00-1.00	-	5.00-18.24	-
F			3	-	1	-	5	-	1
R			3	-	4	-	1	-	4
MR			0	-	1	-	0	-	1
T			0	-	0	-	0	-	0

A= Incidence%; B= Reaction

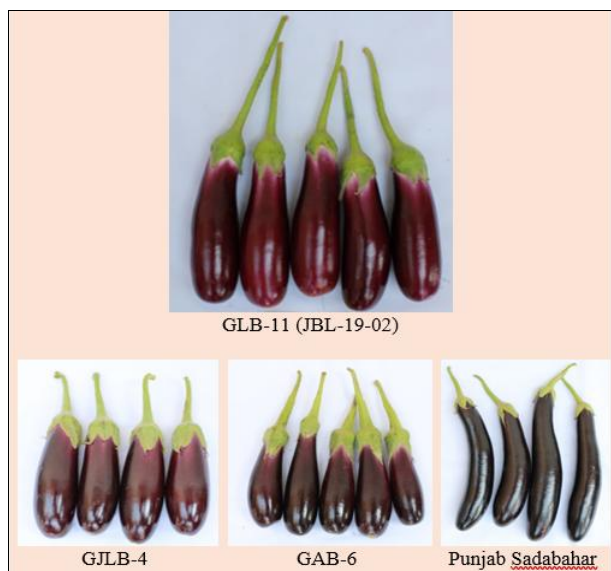
Rating Scale	Per cent plants infected	Reaction	Source
0	No infection	Disease Free (F)	Khalid Pervaiz Akhtar, Ghulam Sarwar, Nighat Sarwar and Muhammad Tanvir Elahi (2013). Field Evaluation of sesame germplasm against Sesame Phyllody disease, <i>Pak. J.Bot.</i> , 45(3):1085-1090.
1	0.1-10 percent plants infected	Resistant (R)	
2	10.1-20 percent plants infected	Moderately resistant (MR)	
3	20.1-30 percent plants infected	Tolerant (T)	
4	30.1-40 percent plants infected	Moderately Susceptible (MS)	
5	40.1-50 percent plants infected	Susceptible (S)	
6	More than 50 percent plants infected	Highly Susceptible (HS)	

Table-5: Reaction to major pest recorded from 2021-22 to 2023-24 at Junagadh Center

Name of Pest	Year	GLB-11	Checks		
			GJLB-4 (SC)	GAB-6 (SC)	Punjab Sadabahar (NC)
No. of jassids/leaf (Junagadh)	2021-22	1.30	1.36	1.25	2.08
	2022-23	2.41	3.08	2.78	3.43
	2023-24	1.12	1.46	1.30	2.68
	Range	1.12-2.41	1.36-3.08	1.25-2.78	2.08-3.43
No. of jassids/leaf (Anand)	2021-22	3.66	3.09	2.62	6.33
	2022-23	3.24	3.90	4.45	5.35
	2023-24	3.80	3.87	3.00	6.13
	Range	3.24-3.80	3.09-3.90	2.62-4.45	5.35-6.33
No. of whitefly/leaf (Junagadh)	2021-22	1.60	1.94	1.10	2.65
	2022-23	2.15	2.51	2.41	4.33
	2023-24	1.45	1.83	1.62	2.54
	Range	1.45-2.15	1.83-2.51	1.10-2.41	2.54-4.33
No. of whitefly/leaf (Anand)	2021-22	3.92	5.21	3.97	7.13
	2022-23	2.91	3.58	4.06	6.33
	2023-24	2.87	4.20	3.67	6.47
	Range	2.87-3.92	3.58-5.21	3.67-4.06	6.33-7.13
Shoot & fruit borer damage (%) (Junagadh)	2021-22	1.81	3.60	3.78	4.13
	2022-23	1.25	4.10	2.93	3.17
	2023-24	2.74	4.38	4.29	5.02
	Range	1.25-2.74	3.60-4.38	2.93-4.29	3.17-5.02
Shoot & fruit borer damage (%) (Anand)	2021-22	4.85	4.17	2.02	4.13
	2022-23	3.96	4.29	4.53	5.66
	2023-24	3.67	4.17	3.17	4.67
	Range	3.67-4.85	4.17-4.29	2.02-4.53	4.13-5.66

Table 6: Bio-chemical parameters and milling quality of proposed brinjal variety GLB-11 along with checks

Sr.	Characteristics	GLB-11	Checks		
			GJLB-4 (SC)	GAB-6 (SC)	Punjab Sadabahar (NC)
1	Moisture (%)	93.47	92.57	91.36	93.33
2	Total soluble solids (Brix)(%)	6.00	5.90	5.20	6.30
3	Total soluble sugar (%)	3.32	3.95	4.30	4.10
4	Total phenol (%)	0.32	0.47	0.79	0.44
5	Acidity (%)	0.13	0.08	0.13	0.21



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