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Heritability and Genetic Advance Studies on Fruit Yield and It's Attributes Traits in Brinjal (*Solanum melongena* L.)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present investigation was conducted at the Main Vegetable Research Station, Anand Agricultural University, Anand during the period of 2023-2024. The experimental material comprised twelve generations *viz*., P_1, P_2, F_1, F_2, B_1, B_2, B_{11}, B_{12}, B_{21}, B_{22}, B_{1S} and B_{2S} of four families involving eight diverse cultivars of brinjal (*Solanum melongena* L.) used to study the heritability and genetic advance of brinjal for yield and shoot and fruit borer incidence. The experiment was laid out in a compact family block design with three replications. Higher magnitude of heritability along with a higher value of genetic advance as per cent mean was estimated for day to first flowering in family 2, plant height in family 1 and family 4, leaf blade length in family 4, leaf blade width in family 2, fruit length in all families, fruit girth in family 3 and 4, fruit weight in all families expect to family 2, fruits per plant in family 2, fruit yield per plant in all families expect family 4 and shoot and fruit borer incidence in family 2 which suggested preponderance of additive gene effect. The higher value of heritability coupled with the higher value of genetic advance shows higher selection efficiency, permitting plant breeders to efficiently select individuals or groups of individuals. In crops like brinjal, high narrow sense heritability estimates are particularly beneficial for developing enhanced varieties through the fixation of additive gene effects.

Keywords: Brinjal; broad sense heritability; narrow sense heritability; genetic advance.

1. INTRODUCTION

Brinjal (*Solanum melongena* L.) is an important vegetable crop in the Solanaceae family and is a species of nightshade [1]. It is also referred to as eggplant, guinea squash, or aubergine which is widely grown in the temperate, subtropics and tropics regions [2]. *Solanum* is a very great genus and amongst the 22 Indian species of brinjal, all are diploid and have the somatic chromosome number 2n = 2x = 24. It is cultivated worldwide and originated from the Indo-Burma region. It is extremely productive and generally called the poor man's crop. Brinjal is a self-pollinated crop but the extent of cross-pollination is reported as high as 29 per cent because of the heterostyly condition hence it has been divided as often cross-pollinated crop or a facultative cross-pollinated crop [3]. It comprises a high quantity of carbohydrates (6.4%), fat (0.3%), protein (1.3%), phosphorus (0.02%), iron (0.0013%), calcium (0.02%) and other mineral matters [4].

The ultimate goal of any plant breeding programme is to create improved genotypes that are better than their current ones in one or more traits that produce higher economic yield. To create an effective breeding strategy, one must have a sufficient understanding of the inheritance of quantitative traits as well as information about fruit yield heritability, its components and quality traits [5]. Heritability is defined as the amount of the total variation in a given phenotypes within the population that is attributed to genetic variance. The genetic improvement of a plant and the surrounding environment control the phenotypic expression of the plant trait. Thus, the magnitude of variability existing in some key gainful traits and their heritability along with genetic advances will be fruitful to the breeders for selecting effectively and creating sound breeding programs. Information about heritability assists plant breeders in predicting the nature of the progeny, forming a proper selection and evaluating the increase of genetic advancement through selection [2]. An enhancement in yield and quality of brinjal is normally accomplished by selecting the genotypes with the required trait combination prevailing in nature or by hybridization [6]. Hence, the present study was carried out to evaluate the broad and narrow sense heritability and genetic advance for thirteen traits in brinjal.

2. MATERIALS AND METHODS

2.1 Field Evaluation

The material comprised eight genetically diverse genotypes of brinjal (AB 20-19 GAOB 2, AB 20-13, CO 2, Anand Harit, GJB 3, GPBRJ 204 and Arka Harshitha) which were selected based on plant or fruit morphology traits. There were four hybrids (AB 20-19 × GAOB 2, AB 20-13 × CO 2, Anand Harit × GJB 3 and GPBRJ 204 × Arka Harshitha) obtained from Main Vegetable Research Station, Anand Agricultural University, Anand. Backcrossing was done in *Kharif-rabi* 2021-22 with its respective parents. Selfing of F_1's was done in the same season to get F_2's and also made fresh F_1. Again, double back-crosses were done with their respective parents in *Kharif-rabi* 2022-23. Selfing of B_1 and B_2 was done in the same season to get B_{1S} and B_{2S}. The evaluation trial was conducted in *Kharif-rabi* 2023-24 at the Main Vegetable Research Station, Anand Agricultural University, Anand. The experimental material consists of twelve generations (P_1, P_2, F_1, F_2, B_1, B_2, B_{11}, B_{12}, B_{21}, B_{22}, B_{1S} and B_{2S}) of each of the four families in Compact Family Block Design with three replications. Each replication was classified into four compact family blocks. Each family of twelve generations was randomly allotted to each plot within a block. Inter and intra-row spacing was 90 cm and 60 cm, respectively. Standard agronomical practices were followed to raise for better yield and healthy crops. The observations were recorded on thirteen characters *viz*., Days to first flowering, branches per plant, plant height (cm), leaf blade length (cm), leaf blade width (cm), fruit length (cm), fruit girth (cm), fruit length/girth ratio, fruits per plant, fruit yield per plant (kg), total soluble solids (°Brix) and shoot and fruit borer (%) incidences. These thirteen traits were recorded for each family *i.e.* from five plants in P_1, P_2 and F_1, ten plants in B_1 and B_2 and twenty plants in F_2, B_{11}, B_{12}, B_{21}, B_{22}, B_{1S} and B_{2S} generations.

2.2 Statistical Analysis

2.2.1 Broad sense heritability

The broad sense heritability h^2_b (a) in per cent was calculated by using the formula reported by [7] as follows.

$$h^2b\ (a)(\%) = \frac{VF_2 - \sqrt{VP_1 \times VP_2}}{VF_2} \times 100$$

The broad sense heritability h^2_b (b) in per cent was calculated by using the formula reported by [8] as follows.

$$h^2_b\ (b)\ (\%) = \frac{VF_2 - \frac{(VP_1 \times VP_2)+VF_1)}{3}}{VF_2} \times 100$$

The broad sense heritability (c) in per cent was calculated by using the formula reported by [8] as follows.

$$h^2_b\ (c)\ (\%) = \frac{VF_2 - \frac{(VP_1+VP_2)}{2}}{VF_2} \times 100$$

The broad sense heritability (d) in per cent was calculated by using the formula reported by [9] as follows.

$$h^2_b\ (d)\ (\%) = \frac{VF_2 - \frac{(VP_1+VP_2+2VF_1)}{4}}{VF_2} \times 100$$

Where,

h^2_b = Heritability in broad sense
VF_2 = Variance of F_2 generation
VF_1 = Variance of F_1 generation
VP_2 = Variance of P_2 generation
VP_1 = Variance of P_1 generation

2.2.2 Narrow sense heritability

The narrow sense heritability in per cent was calculated by using the formula reported by [10] as follows.

$$h^2n\ (\%) = \frac{2VF_2 - (VB_1 + VB_2)}{VF_2} \times 100$$

Where,

h^2_n = Heritability in the narrow sense
VF_2 = Variance of F_2 generation
VB_1 = Variance of B_1 generation
VB_2 = Variance of B_2 generation

The above heritability estimate is based on the assumption that epistasis is absent.

2.2.3 Expected genetic advance

The expected genetic advance at 5 % selection intensity was estimated by using the formula suggested by [8] as follows.

$$G.A. = h^2_{(ns)} \times k \times \sigma_p$$

Where,

h^2(ns) = heritability in narrow sense
k = selection differential (k = 2.06 at 5 % selection intensity)
σ_p= phenotypic standard deviation

3. RESULTS AND DISCUSSION

The both broad and narrow sense heritability estimations are vital. Yet, in segregating generations, calculating narrow sense heritability offers further accurate results. Hence, narrow sense heritability is further beneficial for choosing segregating populations in this study. The genetic advance is calculated based on the narrow sense of heritability toward confirming reliable results and enhancements in the mean genotypic value of certain families over the base population. These results for different traits studied in four families of brinjal (AB 20-19 × GAOB 2, AB 20-13 × CO 2, Anand Harit × GJB

3, and GPBRJ 204 × Arka Harshitha) are presented in Table 1. Estimates of broad and narrow sense heritability in per cent of mean for thirteen traits in brinjal genotypes are depicted in Table 1 and Figs. 1 to 4.

3.1 Broad and Narrow Sense Heritability

In family 1 (AB 20-19 × GAOB 2) higher broad sense heritability was recorded for plant height, fruit length, fruit girth, fruit weight and fruit yield per plant (Table 1). While, in family 2 (AB 20-13 × CO 2) for day to first flowering, leaf blade length, leaf blade width, fruit length, fruit girth and fruit yield per plant. In family 3 (Anand Harit × GJB 3) for plant height, fruit length, fruit girth, fruit wight and fruit yield per plant exhibited higher broad sense heritability. In case of family 4 (GPBRJ 204 × Arka Harshitha) for plant height, leaf blade length, fruit length, fruit girth and fruit length/girth ratio depicted higher broad sense heritability.

In family 1 (AB 20-19 × GAOB 2) higher narrow sense heritability was depicted for day to first flowering, branches per plant, plant height, fruit length, fruit girth, fruit weight and fruits yield per plant (Table 1). While, in family 2 (AB 20-13 × CO 2) for day to first flowering plant height, leaf blade width, fruit length, fruits per plant and shoot and fruit borer incidence. In family 3 (Anand Harit × GJB 3) for fruit length, fruit girth, fruit weight, fruits per plant and fruits yield per plant was found higher narrow sense heritability. In case of family 4 (GPBRJ 204 × Arka Harshitha) for plant height, leaf blade length, fruit length, fruit girth, fruit weight and fruits yield per plant depicted higher narrow sense heritability.

These findings are supported by of Chaudhary & Kumar [11] who found for plant height, fruit length, fruit girth, fruit weight, fruits per plant and fruit yield per plant; Mistry et al. [12] who recorded for fruits per plant; Kumari et al. [13] who reported for plant height [14]. fruit length, fruit girth, fruits per plant and fruit yield per plant; Ravali et al. [15] who found for fruit yield per plant; Sujin et al. [16] who exhibited for days to first flowering, branches per plant, fruit length, fruit girth, fruits per plant and fruit yield per plant; Dineshkumar et al. [4] who observed fruit girth, fruit weight, fruits per plant, fruit yield per plant and shoot and fruit borer incidence; Tiwari et al. [17] who found for branches per plant, fruit weight and fruit yield per plant; Verma et al. [18] who recorded for days to first flowering, branches per plant, fruits per plant, fruit yield per plant and shoot and fruit borer incidence; Gazala et al. [19] who found for days to first flowering, [20] branches per plant, fruit weight, fruits per plant and fruit yield per plant; Pandey et al. [21] who depicted for fruits per plant and fruit yield per plant [22,23]; Pramila et al. [24] who exhibited for branches per plant, fruits per plant and fruit yield per plant, Anbarasi & Haripriya [25] who found for branches per plant, fruit weight and fruit yield per plant, Chithra et al. [26] who observed for branches per plant and fruit yield per plant; Datta et al. [2] who found for fruit yield per plant; Prajapati et al. [27] who depicted for fruits per plant and fruit yield per plant; Patil et al. [28] who recorded for plant height, fruits per plant and fruit yield per plant; Durga et al. [3] who exhibited for fruit yield per plant and shoot and fruit borer incidence; Sailesh et al. [29] who recorded for plant height, fruit length, fruit girth, fruit weight and fruit yield per plant; Soumya et al. [30] who found for fruit yield per plant; Verma et al. [31] who found fruit weight and fruit yield per plant; Sonagara et al. [32] who reported for fruit weight, fruits per plant; Mohanty [33] who depicted for plant height, fruit weight, fruits per plant and fruit yield per plant and Rathod et al. [34] who found for fruit weight and fruit yield per plant [35].

In family 1 (AB 20-19 × GAOB 2) moderate broad sense heritability was recorded for day to first flowering, branches per plant, fruit length/girth ratio, fruit weight and total soluble solids, while leaf blade length and leaf blade width had low broad sense heritability for this family. In case of family 2 (AB 20-13 × CO 2) for branches per plant, plant height, leaf blade width, fruit length/girth ratio, fruit weight and total soluble solids exhibited moderate broad sense heritability for this family. In family 3 (Anand Harit × GJB 3) moderate broad sense heritability was recorded for day to first flowering, branches per plant, leaf blade length, fruit length/girth ratio, fruit weight and total soluble solids, whereas leaf blade width and shoot and fruit borer incidence had low broad sense heritability for this family. In family 4 (GPBRJ 204 × Arka Harshitha) moderate broad sense heritability was recorded for day to first flowering, branches per plant, fruit weight, fruits per plant, fruit yield per plant and shoot and fruit borer incidence while leaf blade width and total soluble solids had low broad sense heritability for this family [36,37].

In family 1 (AB 20-19 × GAOB 2) moderate narrow sense heritability was recorded for leaf blade width and fruits per plant, while shoot and fruit borer incidence had low narrow sense heritability for this family. In case of family 2 (AB 20-13 × CO 2) for fruit girth, fruit weight, fruit yield per plant and total soluble solids exhibited moderate narrow sense heritability, whereas branches per plant had low narrow sense heritability for this family. In family 3 (Anand Harit × GJB 3) moderate narrow sense heritability was recorded for branches per plant, plant height and total soluble solids, whereas leaf blade length, leaf blade width and shoot and fruit borer incidence had low narrow sense heritability for this family. In family 4 (GPBRJ 204 × Arka Harshitha) moderate narrow sense heritability was recorded for leaf blade width, fruit girth, fruits per plant and total soluble solids, while day to first flowering had low narrow sense heritability for this family.

3.2 Genetic Advance as Per Cent Mean

High genetic advance was recorded for day to first flowering, branches per plant, plant height, fruit length, fruit weight and fruit yield per plant in family 1 (AB 20-19 × GAOB 2); day to first flowering, plant height, leaf blade width, fruit length, fruits per plant, fruit yield per plant and shoot and fruit borer incidence for family 2 (AB 20-13 × CO 2); fruit length, fruit girth, fruit weight, fruits per plant and fruit yield per plant for family 3 (Anand Harit × GJB 3) and plant height, leaf blade length, fruit length, fruit girth, fruit weight and fruit yield per plant in family 4 (GPBRJ 204 × Arka Harshitha) (Table 1). Moderate expected genetic advance was recorded for fruit girth, fruits per plant in family 1 (AB 20-19 × GAOB 2); leaf blade length, fruit girth, fruit length/girth ratio, fruit weight, total soluble solids and shoot and fruit borer incidence for family 2 (AB 20-13 × CO 2); branches per plant, plant height, total soluble solids for family 3 (Anand Harit × GJB 3) and for leaf blade width, fruit length/girth ratio, total soluble solids for family 4 (GPBRJ 204 × Arka Harshitha). Low genetic advance was reported for leaf blade length, leaf blade width, fruit length/girth ratio in family 1 (AB 20-19 × GAOB 2); branches per plant for family 2 (AB 20-13 × CO 2); leaf blade length, leaf blade width and shoot and fruit borer incidence for family 3 (Anand Harit × GJB 3) and day to first flowering, fruits per plant in family 4 (GPBRJ 204 × Arka Harshitha). However, some of the families revealed negative value of genetic advance for some more traits.

These above similar findings with higher genetic advance as per cent mean for day to first flowering, fruit length, fruit weight, fruits per plant, fruit yield per plant and total soluble solids by rathava et al. [5]; branches per plant, plant height, fruit girth, fruit weight, fruit yield per plant and shoot and fruit borer incidence by savaliya et al. [38]; fruit length/girth ratio by Verma et al. [18] and Datta et al. [2]; branches per plant, plant height and fruit per plant by Sailesh et al. [29] and Soumya et al. [33]; branches per plant, plant height, fruit weight and fruits per plant by Mohanty [33]. Whereas, moderate genetic advance as per cent mean for branches per plant Dineshkumar et al. [6]; leaf blade length and leaf blade width by Kumar et al. [39]; fruit length by savaliya et al. [38] and low genetic advance as per cent mean for day to flowering by savaliya et al. [38] and rathava et al. [5].

High magnitude of heritability coupled with high value of genetic advance as per cent mean were observed for day to first flowering in family 2, plant height in family 1 and family 4, leaf blade length in family 4, leaf blade width in family 2, fruit length in all families, fruit girth in family 3 and 4, fruit weight in all families expect to family 2, fruits per plant in family 2, fruit yield per plant in all families expect family 4 and shoot and fruit borer incidence in family 2, which suggested that heritability of these traits were under the preponderance of additive gene effects. For improvement of such traits, selection would be effective. Moderate to high magnitude of heritability coupled with moderate value of genetic advance as per cent mean were observed for fruit length/girth ratio in family 2, fruit weight in family 2, total soluble solids in all families expect the family 1, which showed that heritability of these traits was due to additive gene effects, indicating that these traits can be further improved by adopting selections in succeeding generations. High heritability associated with moderate to high value of expected genetic advance recorded for fruit girth in family 1 which indicated this trait could be further improved through selection in advanced generation. Low magnitude of narrow sense heritability associated with low value of expected genetic advance was estimated for branches per plant in family 2, leaf blade length in family 1 and shoot and fruit borer incidence in family 1 and family 3, which suggested that heritability of these traits under the control of non-additive gene effect for these family and selection may be ineffective for these traits.

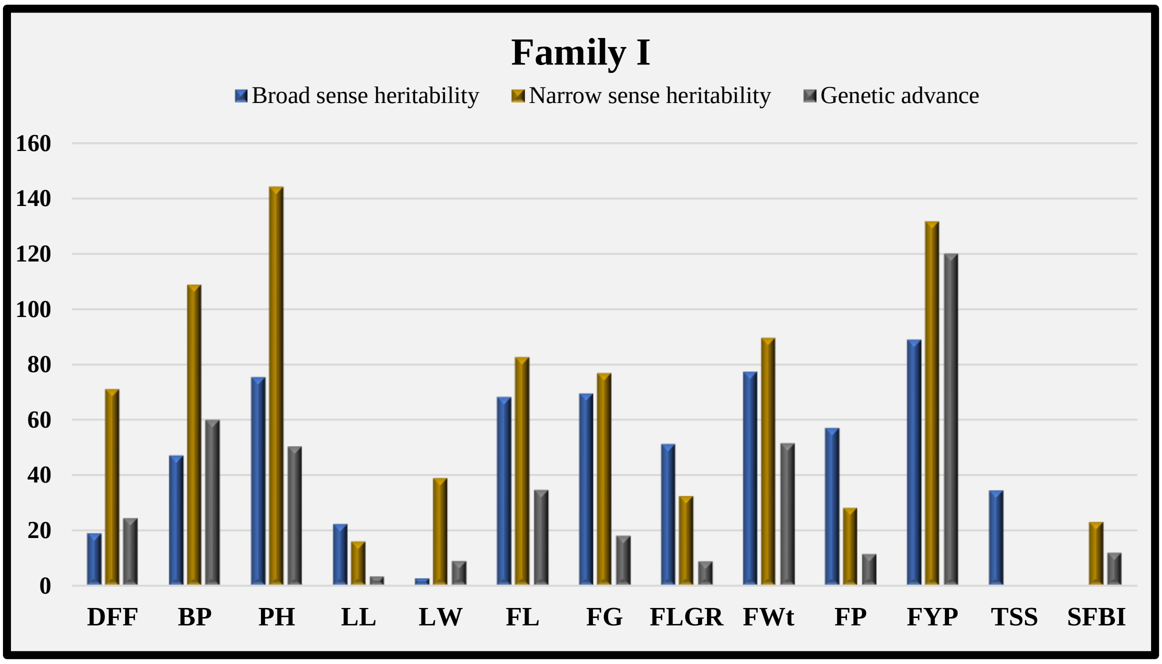

Fig. 1. Heritability (broad and narrow sense) and genetic advance in family I for various traits in brinjal

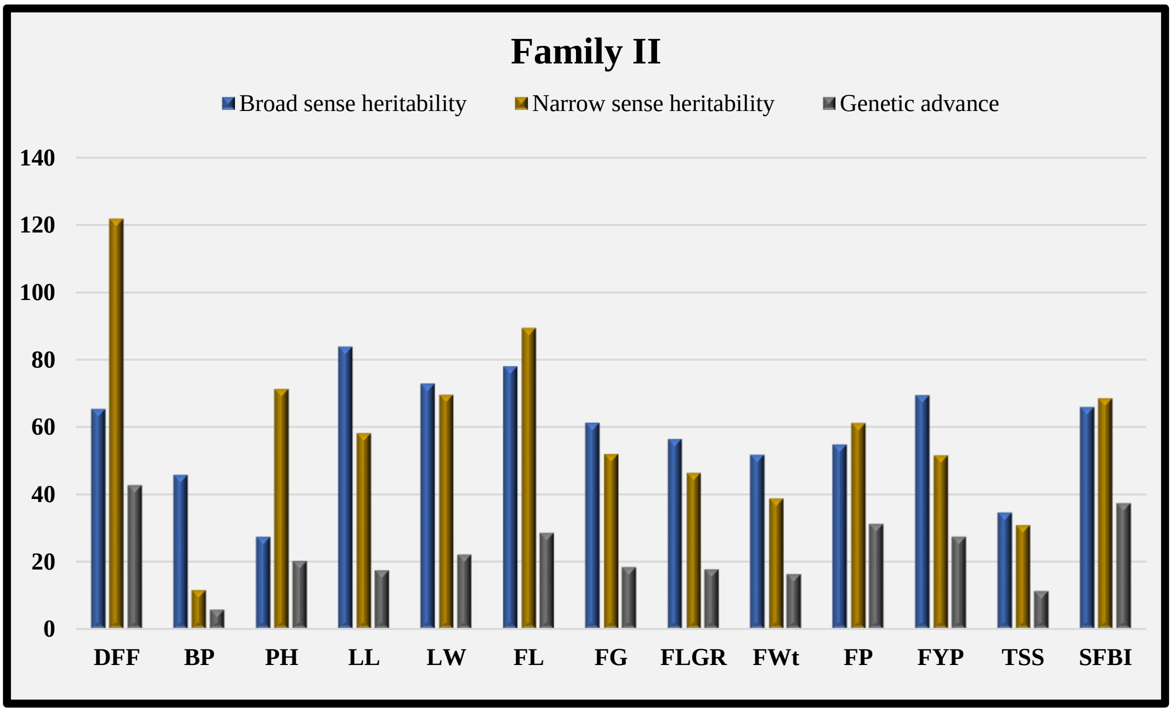

Fig. 2. Heritability (broad and narrow sense) and genetic advance in family II for various traits in brinjal

DFF = Days first to flowering, BP = Branches per plant, PH = Plant height, LL = Length blade length, LW= Length blade width, FL= Fruit length, FG = Fruit girth, FFGR = Fruit length/girth ratio, FW = Fruit weight, FP = Fruits per plant, FYP = Fruit yield per plant, TSS = Total soluble solids and SFBI = Shoot and fruit borer incidence

Table 1. Estimates of heritability and genetic advance for different traits in four families in Brinjal

Family	Broad sense heritability (%)					Narrow sense heritability (%)	Genetic advance (% of mean)
	h^2bs (a)	h^2bs (b)	h^2bs (c)	h^2bs (d)	h^2bs Mean		
	1. Days to first flowering						
Family-I	24.71	@	11.63	20.22	18.85	70.93	24.33
Family-II	63.88	@	63.64	68.16	65.23	121.85	42.68
Family-III	30.64	@	30.33	50.59	37.19	@	@
Family-IV	53.40	@	51.20	@	52.30	4.11	0.93
Maximum	63.88	@	63.64	68.16	65.23	121.85	42.68
Minimum	24.71	@	11.63	20.22	18.69	4.11	0.93
	2. Branches per plant						
Family-I	32.87	76.50	32.87	45.74	47.00	108.66	59.83
Family-II	48.95	61.93	47.55	24.22	45.66	11.55	5.72
Family-III	31.97	43.71	26.29	@	33.99	37.41	19.52
Family-IV	@	36.67	@	@	36.67	@	@
Maximum	48.95	76.50	47.55	45.74	47.00	108.66	59.83
Minimum	31.97	36.67	26.29	24.22	33.99	11.55	5.72
	3. Plant height (cm)						
Family-I	75.74	@	74.75	75.37	75.29	144.09	50.22
Family-II	33.37	@	32.89	15.69	27.32	71.24	20.17
Family-III	88.21	@	88.03	69.89	82.05	53.53	16.61
Family-IV	77.25	@	76.57	69.81	74.55	141.70	47.27
Maximum	88.21	@	88.03	75.37	82.05	144.09	50.22
Minimum	33.37	@	32.89	15.69	27.32	53.53	16.61
	4. Leaf blade length (cm)						
Family-I	23.01	9.97	@	33.51	22.17	15.83	3.26
Family-II	80.52	87.90	88.11	78.39	83.73	58.10	17.40
Family-III	49.88	41.15	44.54	28.44	41.00	12.94	3.41
Family-IV	70.39	50.93	68.28	59.25	62.21	74.31	24.54
Maximum	80.52	87.90	88.11	78.39	83.73	74.31	24.54
Minimum	23.01	9.97	44.54	33.51	22.17	12.94	3.26
	5. Leaf blade width (cm)						
Family-I	@	@	@	2.52	2.52	38.70	8.73
Family-II	73.54	78.39	72.61	66.37	72.73	69.51	22.09

Family	Broad sense heritability (%)					Narrow sense heritability (%)	Genetic advance (% of mean)
	h^2bs (a)	h^2bs (b)	h^2bs (c)	h^2bs (d)	h^2bs Mean		
Family-III	38.34	59.91	33.62	33.06	41.23	13.73	2.74
Family-IV	25.81	6.22	25.72	27.04	21.20	54.38	13.50
Maximum	73.54	78.39	77.61	66.37	72.73	69.51	22.09
Minimum	25.81	6.22	25.72	2.52	2.52	13.73	2.74
	6. Fruit length (cm)						
Family-I	86.49	58.34	80.59	47.03	68.11	82.50	34.43
Family-II	76.11	87.13	75.48	72.87	77.90	89.44	28.59
Family-III	76.55	73.79	74.22	77.69	75.56	60.25	26.29
Family-IV	88.64	93.40	88.70	82.49	88.31	82.67	33.21
Maximum	88.64	93.40	88.70	82.49	88.31	89.44	34.43
Minimum	76.11	58.34	74.22	47.03	68.11	60.25	26.69
	7. Fruit girth (cm)						
Family-I	81.09	70.09	71.31	55.10	69.40	76.67	17.93
Family-II	69.71	63.28	59.70	52.00	61.17	51.98	18.39
Family-III	34.32	@	75.56	72.85	60.91	91.69	21.96
Family-IV	84.42	82.05	84.08	71.07	80.41	48.83	20.37
Maximum	84.42	82.05	84.08	72.85	80.41	91.69	21.96
Minimum	34.32	63.28	59.70	52.00	60.91	48.83	17.93
	8. Fruit length/girth ratio						
Family-I	62.73	66.73	50.00	25.00	51.12	32.33	8.66
Family-II	62.75	75.00	50.00	37.50	56.31	46.31	17.67
Family-III	54.83	76.14	50.22	39.29	55.12	@	@
Family-IV	76.17	92.97	76.09	77.90	80.78	46.60	17.10
Maximum	54.83	92.97	76.09	77.90	80.78	46.60	17.67
Minimum	76.17	66.73	50.00	25.00	51.15	32.33	8.66
	9. Fruit weight (g)						
Family-I	81.25	@	81.23	69.50	77.33	89.41	51.38
Family-II	52.15	@	52.12	50.76	51.68	38.74	16.27
Family-III	87.80	@	80.52	82.08	83.47	87.17	49.18
Family-IV	62.93	@	56.96	54.25	59.04	72.80	50.18
Maximum	87.80	@	81.23	82.08	83.47	89.41	51.38
Minimum	52.15	@	52.12	50.76	51.68	38.74	16.27
	10. Fruits per plant						

Family	Broad sense heritability (%)					Narrow sense heritability (%)	Genetic advance (% of mean)
	h^2bs (a)	h^2bs (b)	h^2bs (c)	h^2bs (d)	h^2bs Mean		
Family-I	64.16	29.39	64.09	70.19	56.96	27.96	11.38
Family-II	59.68	@	49.80	54.71	54.73	61.19	31.23
Family-III	51.97	42.41	51.69	35.99	45.52	114.09	27.50
Family-IV	9.62	@	54.47	30.85	31.65	20.55	7.05
Maximum	64.16	42.41	64.09	70.19	56.96	114.09	31.23
Minimum	9.62	29.39	49.80	30.85	31.65	20.55	7.05
11. Fruit yield per plant (kg)							
Family-I	89.02	92.04	88.78	85.51	88.84	131.51	119.83
Family-II	59.08	94.86	55.55	67.74	69.31	51.52	27.45
Family-III	86.75	85.95	80.75	70.81	81.07	143.99	100.16
Family-IV	33.74	46.58	5.64	22.39	27.08	102.04	96.90
Maximum	89.02	94.86	88.78	85.51	88.84	143.99	119.83
Minimum	33.74	46.58	5.64	22.39	27.08	51.52	27.45
12. Total soluble solids (˚Brix)							
Family-I	@	34.39	@	@	34.39	@	@
Family-II	34.53	46.37	34.32	22.99	34.55	30.84	11.24
Family-III	61.71	46.35	58.16	5.54	42.94	57.89	18.43
Family-IV	23.77	38.64	23.53	15.60	25.39	36.56	13.71
Maximum	61.71	46.37	58.16	22.99	42.94	57.89	18.43
Minimum	23.77	34.39	23.53	5.57	25.39	30.84	11.24
13. Shoot and fruit borer incidence (%)							
Family-I	@	@	@	@	@	22.93	11.81
Family-II	65.11	64.09	64.40	69.69	65.82	68.53	37.38
Family-III	34.59	9.45	34.54	29.03	26.90	22.92	7.84
Family-IV	41.23	@	36.84	49.92	42.67	@	@
Maximum	65.11	64.09	64.40	69.69	65.82	68.53	37.38
Minimum	41.23	9.45	34.54	29.03	26.90	22.92	7.84

@ =Negative estimates

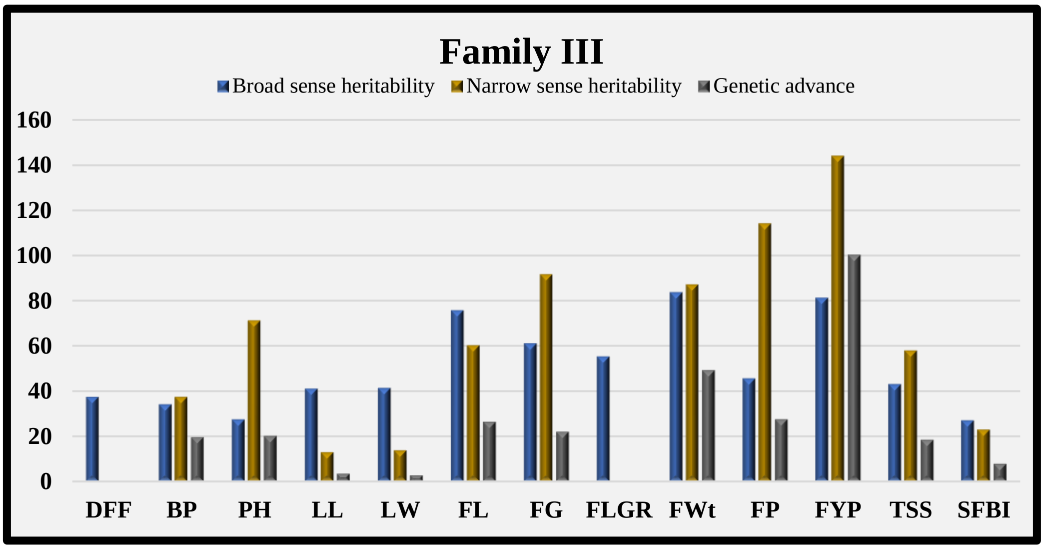

Fig. 3. Heritability (broad and narrow sense) and genetic advance in family III for various traits in brinjal

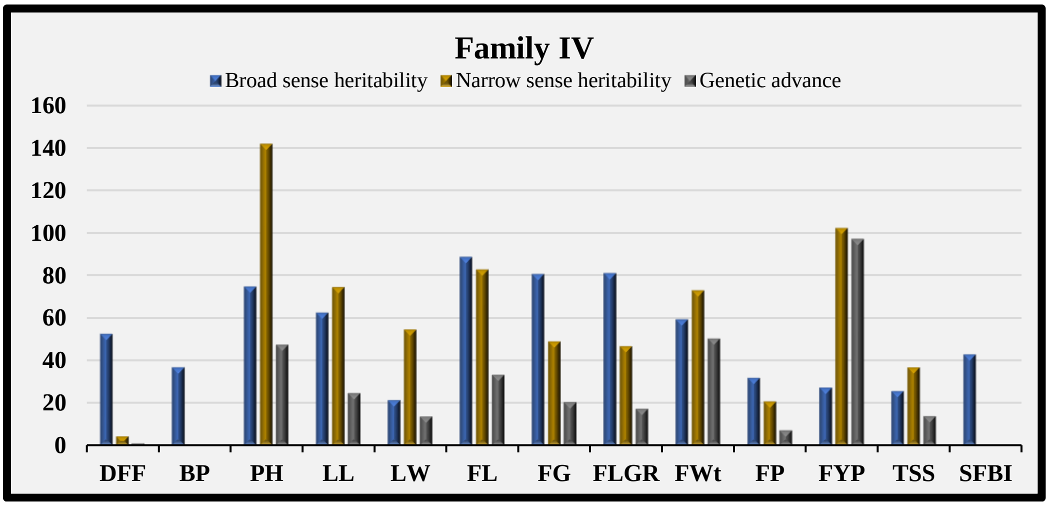

Fig. 4. Heritability (broad and narrow sense) and genetic advance in family IV for various traits in brinjal

DFF = Days first to flowering, BP = Branches per plant, PH = Plant height, LL = Length blade length, LW= Length blade width, FL= Fruit length, FG = Fruit girth, FFGR = Fruit length/girth ratio, FW = Fruit weight, FP = Fruits per plant, FYP = Fruit yield per plant, TSS = Total soluble solids and SFBI = Shoot and fruit borer incidence

4. CONCLUSION

Higher estimates of heritability (broad and narrow sense) coupled with higher genetic advance depicted for fruit yield per plant in family 1 (AB 20-19 × GAOB 2) and family 3 (Anand Harit × GJB 3) which suggest the predominance of additive/fixable gene actions. This trait would be further improved by adopting selection in succeeding segregating generations. Conversely, lower narrow sense heritability along with lower genetic advance which showed that there for days to first flowering in family 4, leaf blade length and width in family 3 and fruits per plant in family 4, suggest the preponderance of non-additive gene action and heterosis breeding or population improvement approaches may be useful for these traits.

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 writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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