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Assessment of genetic variability, heritability and genetic advance in ash gourd [*Benincasa hispida* (Thunb) Cogn.] for yield and yield contributing traits

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Abstract
The present investigation was carried out with 45 genotypes of ash gourd [*Benincasa hispida* (Thunb) Cogn. To estimate variability, heritability and genetic advance over mean for fruit yield and yield component characters. Analysis of variance revealed significant differences for almost all the characters. High genotypic coefficient of variation was observed for, vine length (m), number of fruits per vine, average fruit weight (kg), number of seeds per fruit. Which indicate that there exists high genetic variability and better scope for improvement of these characters through selection. The characters vine length (m), number of primary branches, internodal length (cm), number of male flower, number of female flower, sex ratio, number of fruits per vine, fruit length, fruit circumference, number of seeds per fruit, 100 seed weight (g), fruit yield per vine (kg), TSS, yield/h had high heritability coupled with high genetic advance suggesting improvement of those characters through selection due to additive gene action. In the present study high heritability and low genetic advance was noted for days to first male flower, days to first female flower, days to first harvest and moisture content indicating dominant gene action.

Keywords: Ash gourd, variability, heritability, genetic advance, yield and yield contributing traits

Introduction
Ash gourd [*Benincasa hispida* (Thunb) Cogn.] is a cucurbitaceous vegetable crop grown under wide agroclimatic conditions both for mature and immature fruits. It is preferred among the growers and consumers because of long shelf life under ambient conditions. Ash gourd is also known by a variety of names such as winter gourd, winter melon, white gourd, Chinese preserving melon, pith gourd, wax gourd, Chinese wax gourd, tallow gourd and Chinese water melon (Tindall, 1986 [18]. Pandey *et al*., 2015) [11]. Indo-China region being a centre of diversity is endowed with great variability in terms of morphological characters especially, growth habit and maturity including shape, size and flesh thickness of fruits (Rubatzky and Yamaguchi, 1997).

Ash gourd is an important vegetable mainly valued for its long storage life and good scope for value addition. The fruits are consumed as baked, fried, boiled, pickled or candied/preserved (Robinson and Decker Walters, 1997) [14]. World famous confectionery known as Petha is prepared using ripe flesh in sugar syrup. Ash gourd is valued for its medicinal attributes especially in Ayurveda for the cure of peptic ulcer and the fruit juice is used for treating a range of ailments including insanity and epilepsy. It can also prevent kidney damage (Pandey, 2008) [10]. Its fruits contain a relatively high level of K and low Na and from the index of nutritional quality value, it has been adjudged as a quality vegetable (Pandey, 2008) [10].

In India, although a wide range of variability is available for different component characters in ash gourd (Mandal *et al*., 2002) [9]. But no comprehensive systematic research has been done in this crop. The yield potentiality of this crop needs to be improved through an effective breeding programme. Studies on the variations of yield and yield contributing characters are of great importance before planning abreeding program. The present investigation was carried out with a set of landraces of ash gourd.

Materials and Methods
The study was carried out during the January 2018 to June 2018, at Vegetable Research Station, Palur, Tamil Nadu. The experiment comprised of 45 genotypes of ash gourd where used. (Table 1.)

The experiment was laid out in a randomized block design with three replication at 2 × 1.5m spacing. Recommended agronomic practices were followed to raise a good crop. Observations were recorded from five randomly selected plants from each genotype on 20 different characters viz., Vine length (cm) at harvest, number of branches, internodal length, days to first male flowering, days to first female flowering, node to first male flower, node to first female flower, number of male flowers, number of female flowers, sex ratio, days to first harvest, number of fruits per vine, average fruit weight, fruit length, fruit circumference, number of seeds per fruit, fruit yield per vine, 100 seeds weight, fruit yield per vine, total soluble solids, moisture content (%), estimated fruit yield t /ha for each genotype were recorded from five randomly selected plants per replication.

The mean values were utilized for statistical analysis. ANOVA was worked out for all the characters by making use of means of replication, as suggested by Goulden (1952) [3]. Standard statistical procedures were adopted for calculating the mean, range and various genetic parameters like phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (h2) in broad sense and genetic advance as per cent of mean (GAM).

Results and Discussion

The analysis of variance for 22 biometrical traits of ash gourd genotypes raised during January 2018 to June 2018are presented in Table 2. The analysis of variance revealed significant differences among the genotypes for all the 22 traits. The mean performance of the forty-five genotypes of ash gourd for all the characters studied is furnished in Table 3–4. Estimates on genotypic variance (GV), phenotypic variance (PV), Genotypic Co-efficient of variation (GCV), Phenotypic Co-efficient of variation (PCV), heritability (h2) and genetic advance as per cent of mean (GAM) for twenty-two different traits estimated data are presented in Table 5.

Per Se performance

Mean performance is the fundamental selection criterion for distinguishing superior and inferior performing genotypes. Based on the *per se* performance, the genotypes *viz*., BH-16, BH-21, BH-23, BH-24, BH-29, BH-32 were identified as the best ones for yield and quality characters were data presented in Table 3-4.

Genetic variability, heritability and genetic advance

Studies on genetic parameters such as PCV, GCV, heritability and GAM provide basic information regarding the genetic properties of the given gene pool, based on which breeding methods are to be formulated for further improvement of the crop.

The magnitude of phenotypic coefficient of variation (PCV) was significantly higher than the corresponding genotypic coefficient of variation (GCV) for all the characters under the study, indicating a considerable influence of environment on their expression. Higher magnitude of PCV and GCV (> 20%) respectively were recorded for, number of fruits per vine and average fruit weight, flesh thickness and number of seeds per fruit, are presented in Table 5. indicating the existence of wide range of genetic variability in the germplasm for these traits. This also indicated broad genetic base, less environmental influence and these traits are under the control of additive genes and hence there is a good scope for the further improvement of these characters through selection. High estimates of PCV and GCV were earlier reported for mean fruit weight (Singh *et al*. 2002) [15]. Fruit yield per plant (Bairwa 2016) [1] and fruits per plant (Resmi and Sreelathakumary 2011) [13] in ash gourd.

Moderate phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) was observed for, vine length, number of primary branch, internodal length, number of male flower, number of female flower, sex ratio, fruit length, fruit circumference, 100 seeds weight, fruit yield per vine, total soluble solids, moisture content, estimated fruit yield per/ha. Suggesting that these traits were less influenced by the environment and there was a highly significant effect of genotype on phenotypic expression. Whereas, days to first male flower, days to first female flower, node first male flower, node first female flower, days to first harvest and moisture content registered low genotypic and phenotypic coefficients of variation are presented in Table 5.

The magnitude of heritability ranged from 36.10 to 95.60. Heritability estimates were high (>60%) for all the characters except days to first harvest. which showed that selection in these characters would be effective. Similar findings were recorded Himani Rana (2018) [12] in bottle gourd and Ziaul Hoq Talukder (2018) [17].

The information on heritability alone may be misleading but when used in combination with genetic gain, the utility of heritability estimate increases. In present study, high heritability coupled with high genetic advance as percentage of mean was observed for vine length, number of primary branches, internodal length, number of male flower, number of female flower, sex ratio, number of fruits per vine, average fruit weight, fruit length, fruit circumference, flesh thickness, number of seeds per fruit, 100 seed weight, fruit yield per vine, TSS, estimated fruit yield per/ha- indicating that most likely the heritability is due to additive gene effects and thus the chances of fixing by selection will be more to improve such traits through selection in the evaluated genotypes.

Whereas days to first male flower, days to first female flower, node first male flower, node first female flower, days to first harvest and moisture content recorded low heritability coupled with low genetic advance as per cent of mean.

In the present study, the heritability values were quite high for all the characters, indicating that the major part of the variability was due to genotypic causes. High heritability also indicated that there was more number of additive genes for these characters. The results are in line with the findings of Kumar *et al.* (2008) [6] and Hanchinamani *et al.* (2011) [4] in cucumber.

Number of fruits per vine, average fruit weight, flesh thickness and number of seeds per fruit recorded high estimates of GCV, PCV, heritability and genetic advance as per cent of mean. Similar results were obtained by Kumaran *et al.* (2000) [7] in pumpkin and Resmi and Sreelathakumary (2011) [13] in ash gourd for vine length; Singh *et al*. (2002) [15] and Resmi and Sreelathakumary (2011) [13] for yield per vine in ash gourd.

Table 1: Geographical origin of 45 ash gourd genotypes

Accession No	Accession Name	Source
Bh1	**CO.1**	**TNAU, Coimbatore**
Bh2	AG-TCR-2 IC-596984	NBPGR, New Delhi
Bh3	Palur local	Vegetable Research Station, Palur
Bh4	Palur local	Vegetable Research Station, Palur
Bh5	Palur local	Vegetable Research Station, Palur
Bh6	Palur local	Vegetable Research Station, Palur
Bh7	Palur local	Vegetable Research Station, Palur
Bh8	Palur local	Vegetable Research Station, Palur
Bh9	Palur local	Vegetable Research Station, Palur
Bh10	Palur local	Vegetable Research Station, Palur
Bh11	Palur local	Vegetable Research Station, Palur
Bh12	Palur local	Vegetable Research Station, Palur
Bh13	Palur local	Vegetable Research Station, Palur
Bh14	Palur local	Vegetable Research Station, Palur
Bh15	Palur local	Vegetable Research Station, Palur
Bh16	Palur local	Vegetable Research Station, Palur
Bh17	Palur local	Vegetable Research Station, Palur
Bh18	Palur local	Vegetable Research Station, Palur
Bh19	Palur local	Vegetable Research Station, Palur
Bh20	Palur local	Vegetable Research Station, Palur
Bh21	Palur local	Vegetable Research Station, Palur
Bh22	Palur local	Vegetable Research Station, Palur
Bh23	Villupuram local	Vegetable Research Station, Palur
Bh24	AG-TCR-IC 596986	NBPGR, New Delhi
Bh25	Kanchipuram local	Kanchipuram district
Bh26	Vanthavasi local	Vandhavasi, Tiruvanamalai district
Bh27	AG-TCR-21 IC 613445	NBPGR, New Delhi
Bh28	AG-TCR-18 IC 613454	NBPGR, New Delhi
Bh29	Palur local	Vegetable Research Station, Palur
Bh30	Dharmapuri local	Dharmapuri
Bh31	Tiruvanamalai local	Cheyyar, Tiruvanamalai district
Bh32	Vellore local	Gudiyatham Vellore district
Bh33	AG-TCR-15 IC 596997	NBPGR, New Delhi
Bh34	Palur local	Vegetable Research Station,Palur
Bh35	Tindivanam local	Tindivanam, Villupram district
Bh36	Salem local	Attur, Salem district
Bh37	AG-TCR- IC 596985	NBPGR, New Delhi
Bh38	AG-TCR-13 IC 596995	NBPGR, New Delhi
Bh39	AG-TCR-23 IC 613456	NBPGR, New Delhi
Bh40	Villupuram local	Olakkur, Villupuram district
Bh41	AG-TCR-16 IC 613454	NBPGR, New Delhi
Bh42	AG-TCR-19 IC 613444	NBPGR, New Delhi
Bh43	AG-TCR-26 IC 613457	NBPGR, New Delhi
Bh44	Palur local	Vegetable Research Station,Palur
Bh45	AG-TCR-33 IC 613454	NBPGR, New Delhi

Table 2: Analysis of variance for 22 quantitative characters studied in ash gourd genotypes

S. No	Characters	Mean Sum of Square		
		Replication (2)	**Genotypes (44)**	**Error (88)**
1	VL	0.280	2.784*	0.138
2	N. B	0.460	1.686*	0.112
3	I.L	1.772	12.002*	0.404
4	DFMF	31.638	13.004*	4.830
5	DFFF	0.822	10.947*	4.057
6	NFMF	37.658	9.140*	2.649
7	NFFF	50.787	14.104*	5.101
8	NMF	15.100	45.209*	3.297
9	NFF	0.174	5.715*	0.588
10	SR	0.267	1.334*	0.083
11	DFH	15.473	18.990*	7.055
12	N.F.P. V	0.014	4.091*	0.081
13	A.F. W	0.602	3.622*	0.093
14	F. L	91.941	62.511*	3.151
15	F.C	7.381	324.297*	4.876
16	F.T	0.720	1.821*	0.127

17	N.S.P. F	4252.770	62030.024*	2761.646
18	100 SW	0.069	1.820*	0.094
19	F.Y.P. V	14.362	8.205*	0.341
20	TSS	0.001	0.532*	0.091
21	M.C	1.970	1.792*	0.577
22	Y/Ha	134.074	59.668*	6.328

V.L	Vine length (cm) at harvest	**N.F.P.V**	Number of fruits per vine
N. B	Number of branches	**A.F.W**	Average fruit weight (g)
I.L	Internodal length (cm)	**F.L**	Fruit length (cm)
D.F.M.F	Days to first male flowering	**F.C**	Fruit circumference (cm)
D.F.F.F	Days to first female flowering	**F.T**	Number of seeds per fruit
N.F.M.F	Node to first male flower	**N.S.P.F**	Fruit yield per vine (Kg)
N.F.F.F	Node to first female flower	**100 SW**	100 seeds weight
N.M.F	Number of male flowers	**F.Y.P.V**	Fruit yield per vine (Kg)
N.F.F	Number of female flowers	**TSS**	Total Soluble Solids
S.R	Sex ratio	**M.C**	Moisture content (%)
D.F.H	Days to first harvest	**Y/Ha**	Estimated fruit yield t /ha

Table 3: Mean performance of ash gourd genotypes for vegetative traits

Genotypes	VL	N.B	I.L	DFMF	DFFF	NFMF	NFFF	NMF	NFF	SR	DFH
BH-1	5.27	4.80	9.81	64.89	66.24	21.38	31.83	22.41	7.72	2.88	131.53
BH-2	5.43	5.40	9.35	62.33	65.23	25.95	26.76	25.61	6.66	3.89	134.45
BH-3	7.64	4.13	15.09	61.03	66.35	24.94	28.93	33.95	7.87	4.67	131.34
BH-4	4.75	6.28	10.44	64.49	66.70	25.11	27.51	21.99	6.31	3.38	135.39
BH-5	6.12	5.73	9.60	61.80	65.13	25.45	30.89	33.12	6.88	4.58	134.58
BH-6	5.59	4.70	10.75	60.77	66.57	27.05	31.05	26.85	6.80	4.07	135.29
BH-7	7.07	6.07	10.76	61.07	65.43	22.81	29.64	32.81	8.53	4.19	135.51
BH-8	4.75	6.47	10.74	63.59	65.81	22.68	31.76	28.10	6.72	3.98	132.19
BH-9	4.50	5.81	14.03	62.46	67.23	23.81	32.74	24.81	7.17	3.74	132.20
BH-10	5.97	6.33	14.16	60.69	64.62	22.90	33.20	26.00	7.00	3.70	132.08
BH-11	4.40	4.53	13.00	61.74	64.49	24.14	31.44	29.12	8.77	4.04	132.66
BH-12	4.60	4.73	9.71	63.19	66.62	23.67	28.75	25.13	7.40	3.31	131.09
BH-13	5.23	4.40	11.83	60.30	64.53	23.85	28.99	28.09	9.79	2.80	135.22
BH-14	4.23	5.00	11.10	64.85	66.40	24.90	27.69	23.74	6.47	3.57	132.89
BH-15	5.87	5.33	10.68	60.93	64.43	23.84	28.99	32.55	11.03	2.91	135.24
BH-16	4.61	4.93	6.69	56.16	60.37	22.75	24.98	31.09	10.14	3.77	128.33
BH-17	4.40	5.93	9.50	64.56	66.35	22.04	29.81	30.24	6.87	4.41	133.65
BH-18	4.13	4.53	11.00	63.81	67.21	20.01	31.37	30.21	6.47	4.64	134.99
BH-19	5.23	4.87	11.40	63.77	66.60	21.60	32.92	27.57	7.14	3.58	134.89
BH-20	5.90	5.13	12.00	62.59	66.66	20.87	30.78	27.56	5.53	5.00	131.89
BH-21	5.23	5.31	9.30	64.58	65.58	22.15	29.91	21.80	9.53	2.25	134.89
BH-22	5.55	5.67	8.20	64.40	66.97	22.77	29.55	24.96	7.87	2.98	131.30
BH-23	4.23	5.53	11.43	59.00	62.17	20.61	26.31	29.11	9.17	3.13	128.02
BH-24	7.80	4.90	12.44	56.36	60.06	24.84	26.71	29.29	10.86	3.43	128.03
BH-25	3.58	6.10	8.80	64.47	65.53	25.80	29.68	26.06	6.87	3.53	131.17
BH-26	4.32	5.33	8.00	63.17	68.02	22.67	27.72	27.15	7.27	3.67	132.78
BH-27	3.87	5.50	9.20	60.73	64.65	22.75	28.12	29.08	7.33	3.86	135.31
BH-28	4.42	6.70	8.60	61.35	64.04	22.26	27.72	27.86	8.13	3.36	134.32
BH-29	4.01	7.23	6.00	60.71	65.02	19.77	25.21	26.07	11.29	2.22	131.29
BH-30	6.03	4.44	12.80	60.96	63.22	25.65	25.00	30.82	7.33	4.33	136.40
BH-31	5.88	5.87	14.00	60.78	66.05	23.76	30.28	21.34	7.13	2.93	132.12
BH-32	5.41	6.30	7.00	61.27	62.90	20.87	26.33	29.04	8.87	3.25	133.34
BH-33	4.34	5.40	10.20	63.96	66.45	25.88	28.86	36.55	7.33	3.91	131.67
BH-34	5.23	6.70	8.80	62.67	65.38	22.30	32.60	34.74	7.33	4.68	135.02
BH-35	4.56	6.20	7.20	62.88	66.66	21.77	28.09	27.04	10.53	2.42	137.72
BH-36	6.34	5.07	9.60	63.38	66.04	21.68	30.19	26.97	7.00	3.82	130.05
BH-37	5.18	6.30	10.60	60.92	63.93	22.03	30.03	28.54	7.33	3.87	135.36
BH-38	6.13	4.60	9.74	60.25	66.76	22.86	27.05	33.75	8.87	3.76	131.83
BH-39	5.50	5.09	10.70	63.71	68.68	20.40	31.26	35.77	8.56	4.23	137.28
BH-40	4.80	6.43	9.60	64.62	66.56	22.27	30.23	33.08	7.89	4.09	139.44
BH-41	4.20	5.99	9.10	62.94	65.61	21.79	28.94	30.17	6.43	4.42	133.43
BH-42	5.90	6.20	8.60	63.68	69.50	23.36	31.88	32.79	9.56	3.35	137.22
BH-43	6.30	6.60	9.60	64.25	68.80	23.10	29.87	33.80	7.84	4.28	133.41
BH-44	6.39	5.50	11.40	65.19	66.11	20.93	26.59	34.30	7.51	4.71	136.11
BH-45	5.37	6.15	11.40	64.22	68.10	22.02	29.30	30.25	8.47	3.42	134.79
MEAN	5.25	5.56	10.31	62.34	65.68	22.98	29.28	28.92	7.95	3.71	133.51

S.E.	0.21	0.19	0.37	1.27	1.16	0.94	1.30	1.05	0.44	0.17	1.53
C.D. (5%)	0.60	0.54	1.03	3.57	3.27	2.64	3.66	2.95	1.24	0.47	4.31
CV (%)	7.08	6.02	6.17	3.53	3.07	7.08	7.71	6.28	9.65	7.76	1.99

V.L	Vine length (cm) at harvest	**N.F.F.F**	Node to first female flower
N.B	Number of branches	**N.M.F**	Number of male flowers
I.L	Internodal length (cm)	**N.F.F**	Number of female flowers
D.F.M.F	Days to first male flowering	**S.R**	Sex ratio
D.F.F.F	Days to first female flowering	**D.F.H**	Days to first harvest
N.F.M.F	Node to first male flower		

Table 4: Mean performance of ash gourd genotypes for yield and its related attributes

Genotypes	N.F.P.V	A.F.W	F.L	F.C	F.T	N.S.P.F	100 SW	F.Y.P.V	TSS	M.C	Y/Ha
BH-1	1.73	7.70	40.00	79.15	5.40	649.45	5.17	8.02	2.50	95.48	25.40
BH-2	3.00	3.07	35.86	40.55	4.50	501.54	4.28	7.92	2.32	95.58	23.92
BH-3	2.80	3.50	44.64	84.09	2.50	486.38	3.90	10.16	2.98	93.82	30.63
BH-4	3.26	2.14	31.97	55.55	4.03	623.28	5.54	6.61	2.56	95.96	21.71
BH-5	2.45	3.45	35.80	71.19	3.20	530.01	4.18	9.64	2.12	94.82	25.73
BH-6	3.32	2.78	34.09	54.51	2.91	382.70	3.98	7.38	2.39	94.72	21.90
BH-7	3.48	2.70	35.35	58.60	4.30	456.18	4.16	9.58	2.26	96.36	26.12
BH-8	3.98	2.01	33.80	67.60	3.60	684.26	5.22	8.11	2.50	95.23	24.43
BH-9	2.42	3.43	35.68	66.40	2.50	734.86	6.25	7.86	2.13	95.30	22.04
BH-10	2.90	3.50	37.14	63.28	3.66	758.12	5.81	9.93	3.13	96.46	30.92
BH-11	2.83	3.04	36.87	63.18	2.60	542.70	4.82	9.21	2.55	95.03	26.09
BH-12	3.01	3.12	32.34	63.70	5.00	687.49	4.52	9.77	2.51	93.33	28.58
BH-13	3.23	2.55	33.62	54.57	2.80	480.75	4.05	8.58	3.51	96.59	20.95
BH-14	2.22	3.55	33.69	65.00	2.30	744.84	5.29	8.11	2.19	95.66	24.35
BH-15	3.21	2.96	29.08	47.02	2.50	419.26	4.17	11.28	2.63	96.41	30.48
BH-16	6.93	1.50	21.40	37.54	2.60	257.55	3.41	11.64	2.90	96.35	31.87
BH-17	2.21	4.00	39.61	69.40	5.00	788.69	5.47	8.21	2.72	95.34	26.52
BH-18	2.71	4.08	35.92	67.00	3.00	535.08	4.08	10.36	3.00	95.27	29.72
BH-19	3.47	1.38	29.62	42.40	3.56	558.77	4.99	5.17	2.81	96.63	13.42
BH-20	4.44	2.02	37.79	67.10	3.80	623.73	5.26	10.10	2.72	95.83	27.67
BH-21	5.67	1.71	28.55	52.42	2.90	549.18	5.24	9.94	2.72	96.46	29.54
BH-22	3.87	2.72	29.60	56.20	3.20	453.75	3.92	10.63	3.00	95.70	31.58
BH-23	4.50	2.50	36.20	63.87	2.70	389.54	4.03	11.91	2.51	96.56	34.01
BH-24	6.70	1.60	25.70	44.80	2.10	286.38	3.78	11.97	2.67	96.22	33.09
BH-25	2.96	3.12	34.60	63.57	3.67	558.42	4.11	9.52	2.99	95.69	27.37
BH-26	3.50	2.28	33.80	53.03	2.10	650.51	5.49	9.12	2.82	96.44	24.63
BH-27	2.61	3.44	31.60	56.20	3.30	540.41	4.11	9.80	2.61	95.52	27.55
BH-28	3.67	2.45	32.70	58.20	3.20	540.22	5.10	9.50	2.77	96.50	28.59
BH-29	6.49	1.23	23.09	37.27	2.30	230.19	4.01	6.93	4.50	96.76	27.30
BH-30	4.67	2.02	29.99	53.00	3.00	734.62	5.17	11.02	2.58	94.88	29.54
BH-31	2.45	3.49	33.40	64.03	2.70	334.28	3.95	9.13	2.90	95.50	25.93
BH-32	4.89	2.30	31.00	64.40	2.90	450.30	5.01	12.41	2.92	95.83	33.95
BH-33	3.32	1.86	28.31	50.80	3.50	614.12	5.85	7.12	2.67	96.39	19.38
BH-34	3.12	2.18	27.45	47.46	3.10	694.11	5.94	6.95	2.41	96.61	20.87
BH-35	2.96	4.00	38.07	59.80	3.20	776.37	5.51	11.31	2.48	94.56	30.29
BH-36	2.03	4.28	35.60	61.20	3.30	712.05	5.39	9.27	2.90	96.24	26.06
BH-37	3.67	2.64	31.00	53.80	2.30	481.93	4.33	10.86	2.78	95.79	29.99
BH-38	2.89	2.63	35.37	53.76	2.00	654.09	5.82	7.99	3.11	96.44	23.79
BH-39	3.18	1.68	32.00	42.40	3.30	505.18	4.92	6.26	2.72	96.37	16.03
BH-40	3.92	2.23	31.00	49.09	3.10	532.55	3.83	9.62	2.56	94.57	26.23
BH-41	3.67	2.22	30.78	53.60	3.00	490.17	4.02	8.97	2.09	95.71	24.44
BH-42	2.44	4.50	42.60	61.60	3.20	464.72	4.63	11.24	2.00	95.74	31.33
BH-43	3.94	2.34	36.40	43.80	2.95	385.69	3.44	10.28	2.29	96.45	28.46
BH-44	2.95	3.29	37.25	68.20	2.60	650.48	5.73	10.70	2.82	96.15	30.26
BH-45	3.01	3.50	32.97	64.54	4.00	780.42	5.97	9.77	3.15	95.54	30.28
MEAN	3.48	2.86	33.41	57.66	3.19	553.45	4.75	9.33	2.70	95.75	26.73
S.E.	0.16	0.18	1.02	1.27	0.21	30.34	0.18	0.34	0.17	0.44	1.45
C.D. (5%)	0.46	0.50	2.88	3.58	0.58	85.27	0.50	0.95	0.49	1.23	4.08
CV (%)	8.16	10.69	5.31	3.83	11.17	9.50	6.44	6.26	11.19	0.79	9.41

N.F.P.V	Number of fruits per vine	**100 SW**	100 seeds weight
A.F.W	Average fruit weight (g)	**F.Y.P.V**	Fruit yield per vine (Kg)
F.L	Fruit length (cm)	**TSS**	Total Soluble Solids
F.C	Fruit circumference (cm)	**M.C**	Moisture content (%)
F.T	Flesh thickness	**Y/Ha**	Estimated fruit yield t /ha
N.S.P.F	Number of seeds per fruit		

Table 5: Performance of variability for fruit yield and its components in ash gourd

Characters	GCV	PCV	h^2	GAM
V.L	17.89	19.24	86.50	34.26
N.B	13.03	14.35	82.40	24.36
I.L	19.07	20.04	90.50	37.38
D.F.M.F	2.65	4.41	36.10	3.28
D.F.F.F	2.31	3.84	36.10	2.86
N.F.M.F	6.40	9.55	45.00	8.84
N.F.F.F	5.92	9.72	37.00	7.42
N.M.F	12.93	14.37	80.90	23.95
N.F.F	16.45	19.07	74.40	29.23
S.R	17.40	19.05	83.40	32.73
D.F.H	1.49	2.49	36.10	1.85
N.F.P.V	33.21	34.19	94.30	66.43
A.F.W	37.93	39.41	92.60	75.21
F.L	13.32	14.34	86.30	25.48
F.C	17.89	18.30	95.60	36.05
F.T	23.59	26.10	81.70	43.91
N.S.P.F	25.40	27.11	87.70	49.00
100 SW	15.96	17.21	86.00	30.50
F.Y.P.V	17.35	18.45	88.50	33.63
TSS	14.20	18.08	61.70	22.98
M.C	0.66	1.04	41.20	0.88
Y/HA	15.77	18.37	73.80	27.91

V.L	Vine length (cm) at harvest	**N.F.P.V**	Number of fruits per vine
N.B	Number of branches	**A.F.W**	Average fruit weight (g)
I.L	Internodal length (cm)	**F.L**	Fruit length (cm)
D.F.M.F	Days to first male flowering	**F.C**	Fruit circumference (cm)
D.F.F.F	Days to first female flowering	**F.T**	Number of seeds per fruit
N.F.M.F	Node to first male flower	**N.S.P.F**	Fruit yield per vine (Kg)
N.F.F.F	Node to first female flower	**100 SW**	100 seeds weight
N.M.F	Number of male flowers	**F.Y.P.V**	Fruit yield per vine (Kg)
N.F.F	Number of female flowers	**TSS**	Total Soluble Solids
S.R	Sex ratio	**M.C**	Moisture content (%)
D.F.H	Days to first harvest	**Y/Ha**	Estimated fruit yield t /ha

Conclusion

The present study clearly indicates that greater variability exists for all the characters among the genotypes under study. Highest PCV (39.41) and GCV (37.93) were obtained for number of fruits per vine and average fruit weight respectively. Hig h heritability estimates coupled with high genetic advance as per cent of mean were observed vine length, number of primary branches, internodal length, number of male flower, number of female flower, sex ratio, number of fruits per vine, average fruit weight, fruit length (cm), fruit circumference, flesh thickness, number of seeds per fruit, 100 seed weight, fruit yield per vine, TSS, estimated fruit yield/ha. which indicated that these exercising selection for these characters would beunder additive gene effects and these characters are more reliable and effective in improvement of ash gourd.

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