

Original Research Article

Evaluation of Ash Gourd [*Benincasa hispida* (Thunb.) Cogn.] Genotypes

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ABSTRACT

Keywords

Ash gourd,
Earliness, Fruit
yield,
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An experiment was conducted at Horticulture, Research cum Instructional Farm at Department of Vegetable science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), India; during *Kharif* season (2015-16) with the objective to find out suitable ash gourd genotype for earliness and yield under Chhattisgarh plains. Among sixty genotypes, the genotype IAG 7 was noted for earliness (81.96 Days) for days to 50% flowering and the genotype IAG 60 was noted for early male flowering i.e. 28.67. The genotype IAG 55 exhibited early fruit setting (72.27 Days) and the genotype IAG 32 noted for early harvesting i.e. 125.47 Days. Maximum number of fruits per plant (13.35) was recorded in IAG 10. Studies revealed that the genotypes IAG 7, IAG 60, IAG 55, IAG 32 and IAG 10 were found to be promising for earliness and fruit yield.

Introduction

The Cucurbitaceae is one of the most genetically diverse groups of plants in the plant kingdom. It consists of about 118 genera and 825 species. (Robinson and Decker-Walters, 1996). Ash gourd [*Benincasa hispida* (Thunb.) Cogn.] popularly known as Wax gourd, or White pumpkin is important cucurbitaceous vegetable grown thought mainly India in rainy season. It belongs to family cucurbitaceae having chromosome number $2n=24$. It is believed to have originates in India.

Among the cucurbits, ash gourd is considered a prized vegetable because of its high nutritional value, long storage life and good transport qualities, besides its medicinal properties. The young leaves, flowers and both immature and mature fruits are consumed. The mature fleshy fruit is

either eaten raw or cooked as vegetable marrow or 'candied' as sweetmeat popularly known as 'petha'. It is a good source of carbohydrate, vitamin A, vitamin C and minerals like iron and zinc (Randhawa *et al.*, 1983 and Sureja *et al.*, 2006). An enzyme extracted from ash gourd juice can be used in place of calf rennet for producing cheddar cheese (Gupta and Eskin, 1977). It is also used to treat a variety of elements in ayurvedic and naturopathy systems of medicine. Fruit contains 0.4 per cent protein, 1.9 per cent carbohydrate, 0.3 per cent minerals and traces of vitamin A, B and D per 100 g of edible portion (Aykroyd, 1963).

Ash gourd is a monotypic genus, which is why its gene pool is not too diverse, yet the genotypes under cultivation are not well characterized (Peter *et al.*, 1991). At the same time, of course, genotypes possessing

desirable traits are important. Selection of highly productive cultivars of good quality within the available material is most important for increasing the total production of ash gourd. Short vine length, high flesh thickness, and fruit yield are the desirable characters of good quality of ash gourd. Minimum number of days to female flowering, especially if smaller than number of days to male flowering, is another desirable characteristic because it can be an evidence of earliness.

Materials and Methods

The study was carried out during *Kharif* season (2015-2016) at Horticulture Research cum Instructional farm at Department of Horticulture, I.G.K.V., Raipur (C.G.), India. The experiment comprised of sixty genotypes of ash gourd viz., IAG 1, IAG 2, IAG 3, IAG 4, IAG 5, IAG 6, IAG 7, IAG 8, IAG 9, IAG 10, IAG 11, IAG 12, IAG 13, IAG 14, IAG 15, IAG 16, IAG 17, IAG 18, IAG 19, IAG 20, IAG 21, IAG 22, IAG 23, IAG 24, IAG 25, IAG 26, IAG 27, IAG 28, IAG 29, IAG 30, IAG 31, IAG 32, IAG 33, IAG 34, IAG 35, IAG 36, IAG 37, IAG 38, IAG 39, IAG 40, IAG 41, IAG 42, IAG 43, IAG 44, IAG 45, IAG 46, IAG 47, IAG 48, IAG 49, IAG 50, IAG 51, IAG 52, IAG 53, IAG 54, IAG 55, IAG 56, IAG 57, IAG 58, IAG 59 and IAG 60. The experiment was laid out in a Randomized Block Design with three replications at 3.0 × 0.75 m row to row and plant to plant spacing. All the recommended cultural practices were adopted to raise a healthy crop. Data were recorded on five randomly selected plants with respect to characters viz., days to 50% flowering, number of branches per plant, node number at which first male and female flower, days to first male and female flower appears, days to fruit set, days to first fruit harvest, fruit length (cm), fruit girth (cm), average fruit weight (kg), number of seeds

per fruit, number of fruits per plant, total soluble solid (%), 100 seed weight (g), fruit yield per kg, fruit yield per hectare (q/ha) and crop duration. The data were subjected to statistical and biometrical analysis (Singh and Chaudhary (1985).

Results and Discussion

The analysis of variance of all the characters under study is presented in table 1. This analysis of variance revealed that mean sum of squares due to genotypes was highly significant for all characters. This is an indication of existence of sufficient variability among the genotypes for fruit yield and its components traits. Significant mean sum of squares due to fruit yield and attributing characters revealed existence of considerable variability in material studied for improvement for various traits. These findings are in general agreement with the findings of Pandit *et al.*, (2009) and Bhardwaj *et al.*, (2013).

The mean values of different growth and yield parameters with respect to genotypes are presented in table 2. The genotypes significantly differed for days to 50% flowering, number of branches per plant, node number at which first male and female flower, days to first male and female flower appears, days to fruit set, days to first fruit harvest, fruit length (cm), fruit girth (cm), average fruit weight (kg), number of seeds per fruit, number of fruits per plant, total soluble solid (%), 100 seed weight (g), fruit yield per plot (kg), fruit yield per hectare (q/ha) and crop duration. Significant early flowering for days to 50% flowering was noticed in IAG 7 (81.96 Days) while IAG 9 (111 Days) was found to be late in this respect. Male flower was produced at lower nodes (28.67) in IAG 60, whereas, IAG 9 produced female flower on the lower node (30).

Table.1 Analysis of variance for fruit yield and its component characters in ash gourd

S. No.	Character (df)	Mean sums of square		
		Replication	Treatment	Error
		(2)	(59)	(118)
01	Days to 50% flowering	8.687	139.405**	33.203
02	No. of branches per plant	0.478	2.006*	1.408
03	Node number of first female flower appears	16.203	44.942**	6.770
04	Days to first female flower appears date	2.412	116.603**	14.211
05	Node number of first male flower appears	2.085	7.287**	3.968
06	Days to first male flower appears date	15.093	37.395**	11.100
07	Days to fruit set	15.000	130.950**	33.549
08	Days to 1 st fruit harvest	1.875	19.432**	9.095
09	Fruit length (cm)	0.007	5.528**	2.378
10	Fruit girth (cm)	0.093	19.095**	7.356
11	Average fruit weight (kg)	0.038	0.415**	0.045
12	No. of seeds per fruit	363.000	28473.492**	402.474
13	No. of fruits per plant	0.189	4.006**	1.251
14	T.S.S (%)	0.008	0.071**	0.039
15	100 seed weight(g)	0.070	1.519**	0.093
16	Fruit yield/plot (kg)	2.132	75.953**	12.826
17	Duration of crop (sowing to last harvest)	0.125	23.217**	9.613

*: Significant at 5%, **: Significant at 1%.

Table.2 Mean performance of various genotypes of ash gourd for earliness, yield and its different components

Characters	Days to 50% Flowering	No. of branches per plant	Node no. at which 1 st female flower appears	Days to first female flower appears	Node no. at which 1 st male flower appears	Days to first male flower appears	Days to fruit set	Days to 1 st fruit harvest	Fruit length (cm)	Fruit girth (cm)	Average fruit weight (kg)	No. of seeds per fruit	No of fruits per plant	T.S.S (%)	100 seed weight (g)	Fruit yield /plot (kg)	Fruit yield (q/ha)	Duration of crop (sowing to last harvest)
IAG-1	95.33	10.33	43.00	75.67	32.67	61.53	85.50	131.67	23.00	56.05	3.15	485.35	10.33	2.06	4.95	30.67	113.56	137.00
IAG- 2	92.32	11.67	40.75	76.67	31.67	66.50	81.50	130.00	22.33	53.02	2.95	390.66	9.67	2.34	3.83	23.75	87.96	136.33
IAG- 3	103.00	10.41	39.33	79.66	34.58	69.75	93.53	134.57	21.00	51.92	2.27	325.67	8.35	2.45	4.00	24.17	89.52	138.68
IAG- 4	94.33	11.00	43.33	77.33	33.08	67.53	86.00	131.38	22.70	50.12	2.91	460.65	8.33	2.27	4.80	21.87	80.99	138.33
IAG- 5	101.67	11.67	38.33	86.33	34.66	64.77	90.75	133.41	21.00	48.33	2.25	495.33	9.69	2.47	4.06	25.75	95.37	137.00
IAG -6	87.33	10.85	41.66	68.33	33.42	65.27	76.00	126.00	22.33	50.33	2.85	315.43	9.34	2.27	4.63	18.33	67.89	135.33
IAG-7	81.96	10.33	43.67	67.00	34.00	61.67	80.33	130.33	21.67	50.02	2.82	285.66	8.66	2.67	2.87	19.75	73.15	136.67
IAG- 8	96.34	11.24	41.33	67.00	32.66	62.00	86.50	131.37	20.62	47.66	2.35	320.33	8.75	2.13	4.47	21.67	80.26	137.64
IAG- 9	111.00	10.33	30.00	77.67	31.66	74.33	97.33	135.67	19.67	52.33	2.92	309.66	7.24	2.07	3.34	14.73	54.56	144.67
IAG- 10	91.00	13.67	38.92	71.50	32.02	70.67	78.67	130.32	23.33	57.63	3.33	680.35	13.35	2.60	6.67	42.67	158.04	143.75
IAG- 11	86.68	11.00	41.33	71.33	32.67	61.35	76.51	127.64	25.67	55.32	2.24	435.43	10.85	2.52	3.64	29.23	108.26	135.67
IAG- 12	98.00	10.33	39.00	78.33	32.33	60.00	79.75	130.69	22.34	54.13	2.28	345.75	8.67	2.47	4.33	22.17	82.11	136.67
IAG- 13	90.67	10.67	39.83	75.50	32.33	59.67	79.52	130.73	20.33	51.68	2.85	463.99	8.34	2.58	3.48	20.47	75.83	135.00
IAG- 14	104.33	12.00	45.33	89.00	33.68	66.35	93.00	133.00	21.66	55.33	2.38	338.43	7.66	2.47	4.33	17.93	66.41	138.35
IAG- 15	105.66	9.00	41.33	70.66	34.34	65.00	94.35	134.43	22.67	52.50	2.87	397.35	7.45	2.27	3.33	16.33	60.48	139.78
IAG- 16	88.66	10.33	37.08	65.00	30.66	62.66	76.00	127.00	24.23	53.43	2.37	468.52	8.00	2.45	4.00	15.45	57.22	134.66
IAG- 17	87.34	11.00	30.33	68.66	28.99	62.35	77.47	129.80	21.00	50.00	2.58	347.66	7.67	2.13	4.67	18.33	67.89	134.67
IAG- 18	101.00	9.66	38.99	84.66	34.33	63.00	92.67	133.70	21.68	51.66	2.27	281.35	8.57	2.41	3.95	22.09	81.80	140.33
IAG- 19	99.33	11.87	35.34	73.00	33.33	62.33	87.00	129.66	19.66	52.68	2.24	327.95	7.67	2.26	4.05	16.37	60.63	137.75
IAG- 20	95.08	10.00	39.33	79.00	32.66	67.75	85.33	128.64	21.00	49.66	2.85	305.15	9.45	2.08	4.50	23.00	85.19	135.00
IAG- 21	93.00	10.37	47.00	78.00	31.00	61.33	83.60	127.00	22.66	53.65	3.05	314.33	9.38	2.45	5.67	25.38	94.00	136.67
IAG- 22	95.33	11.47	38.67	83.66	34.34	67.00	86.67	130.67	20.68	52.52	2.25	425.53	8.69	2.46	4.33	21.67	80.26	136.67
IAG- 23	92.57	10.00	41.00	77.00	31.99	67.00	82.53	127.61	22.66	50.54	2.87	387.75	8.33	2.25	3.25	23.15	85.74	135.00
IAG- 24	103.00	11.00	37.33	84.99	33.00	69.34	90.75	133.68	21.68	48.00	1.98	247.69	7.66	2.33	4.03	17.07	63.22	139.00
IAG- 25	91.67	10.67	35.64	75.66	33.66	62.00	80.66	131.55	19.35	51.33	2.55	321.35	7.35	2.25	3.45	18.33	67.89	135.78
IAG- 26	105.33	11.00	36.34	66.33	35.34	73.67	99.00	136.67	22.33	53.66	2.27	337.66	8.45	2.40	3.33	20.37	75.44	142.33
IAG- 27	102.00	10.67	40.67	85.00	30.67	64.35	90.27	133.77	20.68	52.33	2.87	328.75	7.69	2.47	4.05	16.47	61.00	137.00
IAG- 28	100.97	11.33	38.33	86.67	33.33	68.33	89.67	132.78	22.66	51.18	2.33	295.67	8.37	2.45	3.63	21.67	80.26	137.66
IAG- 29	89.08	11.25	35.33	69.66	31.66	62.35	78.27	129.57	21.00	53.33	2.87	409.45	8.67	2.27	4.35	22.33	82.70	135.57

IAG- 30	86.33	9.33	32.67	71.75	33.67	68.67	75.00	127.00	21.33	56.00	3.00	487.33	9.33	2.25	4.83	25.84	95.70	134.08
IAG-31	91.67	10.67	38.33	74.00	33.00	67.30	80.33	131.27	22.66	50.52	2.85	318.66	9.69	2.27	3.83	27.33	101.22	136.32
IAG- 32	83.66	11.85	42.00	66.67	36.95	62.00	70.67	125.47	24.35	53.99	2.80	597.43	8.33	2.42	4.25	22.47	83.22	134.67
IAG- 33	98.33	10.33	43.67	68.25	34.86	62.75	87.00	131.58	20.67	54.02	2.87	327.35	7.45	2.47	3.58	20.09	74.40	137.00
IAG- 34	91.00	12.00	38.66	69.33	33.14	65.75	77.20	128.67	23.66	52.00	3.00	305.67	7.33	2.33	3.33	17.37	64.33	135.75
IAG- 35	85.00	10.32	38.66	69.32	33.00	64.33	75.33	127.00	21.33	51.33	2.85	249.33	8.67	2.52	4.30	21.45	79.44	137.94
IAG -36	99.00	10.00	38.66	87.00	33.00	64.00	90.33	133.66	22.02	53.68	2.90	317.35	9.05	2.39	4.50	23.84	88.30	141.33
IAG-37	87.75	11.33	40.66	70.00	33.86	64.27	76.75	128.44	20.33	50.00	2.27	302.74	8.33	2.13	4.80	21.75	80.56	135.33
IAG- 38	102.34	10.00	38.42	73.00	33.67	65.25	90.33	133.64	22.34	52.64	1.98	343.66	9.45	2.47	3.67	26.15	96.85	140.67
IAG- 39	97.66	10.33	41.00	75.66	34.08	65.27	86.00	131.64	20.35	51.78	2.85	253.63	8.67	2.65	3.33	18.66	69.11	137.33
IAG- 40	87.67	10.67	35.67	70.00	34.02	66.00	77.47	129.11	22.40	49.17	2.30	417.35	8.35	2.23	4.30	21.33	79.00	135.33
IAG- 41	86.66	11.33	37.33	69.00	35.67	65.45	76.75	128.54	19.33	53.99	2.85	487.43	10.00	2.35	4.50	31.07	115.07	136.67
IAG- 42	92.00	10.00	41.66	80.67	33.67	69.67	81.67	131.23	21.66	52.68	2.80	311.33	8.67	2.47	4.33	20.47	75.81	138.00
IAG- 43	89.33	11.33	39.00	73.33	32.06	67.55	76.00	128.00	20.75	54.00	2.87	347.43	9.00	2.43	3.33	23.33	86.41	135.33
IAG- 44	95.00	10.67	32.66	79.00	32.34	70.66	85.85	132.33	21.60	48.00	2.27	325.27	8.67	2.25	4.48	19.67	72.85	137.75
IAG- 45	87.33	9.67	40.34	68.66	33.76	67.45	76.00	128.33	22.66	53.64	2.37	573.66	8.33	2.06	3.95	21.75	80.56	135.67
IAG- 46	91.66	10.85	44.67	74.80	34.56	66.43	80.00	131.64	20.66	51.34	2.24	485.35	7.47	2.52	4.83	18.31	67.81	136.00
IAG- 47	86.09	9.67	41.27	70.00	33.76	63.85	74.75	127.53	22.35	50.14	2.58	458.43	8.59	2.57	4.00	22.42	83.04	135.33
IAG- 48	90.66	10.67	32.67	77.75	30.94	72.75	79.47	130.00	22.34	49.83	2.60	490.00	8.33	2.44	5.71	20.67	76.56	136.00
IAG- 49	108.34	10.00	38.00	85.66	30.76	74.00	90.35	133.00	20.32	52.33	2.83	327.33	7.67	2.33	4.33	17.84	66.07	147.33
IAG- 50	90.00	11.33	38.67	74.00	31.60	71.33	78.50	129.36	21.66	54.02	3.90	315.66	9.67	2.53	4.50	26.45	97.98	135.00
IAG- 51	93.67	10.67	38.17	70.00	33.86	65.00	80.00	131.67	22.35	56.78	3.05	281.67	9.33	2.30	4.47	24.15	89.44	136.35
IAG- 52	90.33	10.33	38.83	74.80	31.96	70.00	79.33	130.00	21.34	53.34	2.38	302.66	9.35	2.58	3.83	23.38	86.59	138.75
IAG- 53	91.67	10.00	43.33	74.00	31.07	65.80	80.67	131.41	20.33	50.33	2.87	287.35	8.67	2.25	4.67	21.39	79.22	136.00
IAG- 54	85.33	12.33	44.53	69.40	34.32	65.25	75.33	128.36	23.66	50.98	2.25	525.33	9.00	2.13	3.83	24.07	89.15	135.33
IAG- 55	85.00	11.33	40.87	71.20	35.67	64.45	72.27	126.55	21.66	55.76	2.87	321.66	9.33	2.39	3.54	25.33	93.81	134.00
IAG- 56	90.33	9.47	45.34	76.00	34.86	64.55	77.45	128.36	22.67	52.34	2.15	438.45	9.67	2.47	4.67	20.67	76.56	135.67
IAG- 57	93.33	10.33	33.42	77.25	32.68	67.33	81.75	132.09	20.30	50.00	3.15	331.47	7.33	2.30	3.95	18.75	69.44	136.00
IAG- 58	95.33	10.00	46.33	80.00	31.94	65.25	83.33	132.49	22.00	55.00	2.87	418.33	8.67	2.27	4.33	21.33	79.00	138.33
IAG- 59	103.34	9.67	34.08	85.25	32.09	70.00	90.27	133.70	20.91	54.01	2.70	343.00	9.40	2.13	4.67	22.39	82.93	140.75
IAG- 60	83.66	10.87	31.34	69.40	28.67	66.45	76.60	129.64	25.65	61.33	3.25	637.35	13.00	2.47	6.33	40.67	150.63	144.70
Mean (x)	93.72	10.71	39.15	75.07	33.00	65.97	82.69	130.58	21.78	52.42	2.671	379.64	8.790	2.361	4.216	22.359	82.811	137.39
SEm±	3.27	0.679	1.50	2.167	1.15	1.924	3.343	1.742	0.905	1.566	0.123	11.581	0.645	0.114	0.176	2.067	7.658	1.790
CD (p=0.05)	9.169	1.902	4.20	6.070	3.23	5.390	9.364	4.879	2.535	4.387	0.346	32.435	1.807	0.320	0.493	5.790	21.447	5.014
CV (%)	6.05	10.98	6.64	5.000	6.05	5.052	7.003	2.311	7.198	5.176	8.013	5.284	12.720	8.390	7.236	16.017	16.017	2.257

Early flowering days to first male flower appears was noticed in IAG 13 (59.67 Days) and maximum days to first male flowering was recorded in IAG 9 (74.33 days), whereas, early flowering days to first female flower appears was noticed in IAG 16 (65 Days) and maximum days to first female flowering was recorded in IAG 14 (89 days). The genotype IAG 55 exhibited early fruit setting (72.27 Days) followed by IAG 47 (74.75 Days) and IAG 30 (75 Days). The genotype IAG 32 recorded early harvesting (125.47 Days), whereas, maximum days to first fruit harvest was recorded in the genotype IAG 26 (136.67 days). The results are in agreement with that of Pandey and Singh (2007) in sponge gourd, Kumar *et al.*, (1999) and Sirohi *et al.*, (1988) in bottle gourd.

Higher number of branches was recorded in IAG 10 (13.67) followed by IAG 54 (12.33). The length of fruit ranged from 19.33 cm in (IAG 41) to 25.67 cm in (IAG 11). The fruit girth ranged from 47.66 cm (IAG 8) to 61.33 cm (IAG 60). The genotype IAG 50 recorded highest fruit weight (3.90 kg) and the fruit weight was lowest in IAG 24 & IAG 38 (1.98 kg). Number of seeds per fruit was highest in IAG 10 (680.35) and lowest in IAG 24 (247.69). Number of fruits per plant was highest in IAG 10 (13.35) and lowest in IAG 9 (7.24). The results obtained are in accordance with those of Mahato *et al.*, (2010) for fruit length and Sharma and Sengupta (2013) for fruit length, fruit girth and fruit weight.

Significantly higher fruit yield per hectare was recorded in IAG 10 (158.04 q/ha) followed by IAG 60 (150.63 q/ha). Minimum crop duration (134 days) was recorded in IAG 55 and the maximum crop duration (147.33 Days) was observed in IAG 49. Similar results obtained are in lines with those of Mahato *et al.*, (2010), Husna *et*

al., (2011), Yadav and Kumar (2012), Harika *et al.*, (2012) and Sharma and Sengupta (2013) for fruit yield.

Performance studies revealed that the genotypes IAG 7, IAG 60, IAG 55, IAG 32 and IAG 10 were found to be promising for earliness and fruit yield. In order to improve the fruit yield per plant and other important attributes genotypes falling in distant characters may be utilized in future breeding programme.

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