



PERFORMANCE OF CUCUMBER (*Cucumis sativus* L.) HYBRIDS IN AGRO-CLIMATIC CONDITIONS OF ALLAHABAD

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ABSTRACT: Twenty cucumber hybrids were evaluated for growth, yield and fruit quality traits in Allahabad agroclimic conditions. The study revealed that the hybrid Garima Super recorded highest vine length (249.17 cm), number of branches per vine (11.42), number of male flowers (206.33) and female flowers (29.17) per vine, number of fruits per vine (13.83), fruit weight (168.33 g), fruit length (168.33 cm), fruit diameter (4.03 cm), fruit yield (2.24 kg/ vine and 36.24 t ha⁻¹), TSS (5.50 °Brix), vitamin C content (7.28 mg/100 g) and organoleptic scores for various fruit quality traits while, the lowest days to appearance first male flower (31.92) and female flower (35.83), node number at which first male flower (3.42) and female flower (4.83) appeared and days to first fruit harvest (44.83) were observed in same hybrid. Hybrid Garima Super was found superior based on the overall performance of different cucumber hybrids for growth, yield, quality characters and economic returns for cultivation of cucumber under Allahabad conditions.

Keywords: Cucumber, hybrids, TSS, vitamin 'C', organoleptic test.

Cucumber botanically known as *Cucumis sativus* L. is one of the most important crop of Cucurbitaceae. It is native of India. Cucumber is considered as fourth most important vegetable crop after tomato, cabbage and onion. Of the various vegetables grown in India, cucumber has high place in the diet as a rich source of carbohydrates, as a breakfast fruit and as ingredient of *salads*. Cucumber (*Cucumis sativus* L.) is one of the oldest amongst the cultivated vegetable crops and has been found in cultivation since 3000 to 4000 years. Biochemically the cucurbits are characterized by bitter principles, called cucurbitacins *i.e.* tetracyclic triterpenes (Jeffery, 4). Majority of the cucurbits are either monoecious or andromonoecious (a few dioecious) with trailing habit and are pollinated by insects. It is one of quickest maturing vine vegetables crops. It is a warm season crop and grown mostly during *kharif* and summer seasons in all the parts of the country including hilly parts of North India. The investigation was taken with the objectives to find out the most suitable hybrid in terms of growth, yield and quality of cucumber for commercial cultivation in rainy season under Allahabad condition.

MATERIALS AND METHODS

The present investigation was carried out at vegetable research farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (U.P.) in the year 2011 during rainy season. There were twenty cucumber hybrids viz., Joolie, F₁ Fumiko-10, R. K.-180, J. K. Manali, Dash, Khiaudon, Manvi Plus, Alisha, Noori, LG-40, Hybrid Mala, Agro Priya, Prasad-100, Hybrid -512, Sheetal, Taksin, Kanene, NCH-2, US-249 and Garima Super, which were sown for raising rainy season cucumber crop. All the hybrids were sown on 18th July, 2011 by the raised bed method with spacing of 1.0 m and 1.5 m plant to plant and row to row, respectively. Adopting the recommended cultivation practices for raising a healthy crop and used the trellis system for vines climbing. The experiment was laid out in randomized block design with three replications. Observations on various characters namely, vine length (cm), number of branches, days to first appearance of male and female flower, node number at which first male and female flower appears, number of male and female flowers, number of fruits per vine, fruit diameter (cm), fruit

length (cm), fruit weight (g), days to first fruit harvest, fruit yield (kg/ plant), fruit yield tonnes per hectare, T. S. S. ($^{\circ}$ Brix), vitamin 'C' mg / 100g and sensory evaluation of cucumber by organoleptic properties were recorded from five randomly selected plants of each hybrid. Data was statistically analyzed for the evaluation of hybrids.

RESULTS AND DISCUSSION

The maximum vine length was found with Garima Super (249.17cm) followed by LG-40 (237.92cm), US-24 (222.92cm) and minimum vine length was recorded with Agro Priya (183.75cm) (Table 1). The variation in vine length might have been due to specific genetic makeup of different hybrids, inherent properties, environment factor, hormonal factor and vigour of the crop. Similar results have been reported by Solanki and Seth (9) in cucumber. Maximum number of branches per vine was recorded in Garima Super (11.42) followed by Alisha (10.67) and US-249 (10.50) while, the lowest number of branches per vine was recorded in Hybrid-512 (7.33). The variation in number of branches per vine might have been due to its own genetic makeup and also due to vine length, internodal length, hormonal factor and environmental factor confirming to reports of Sharma and Bhattarai (8) in cucumber. Minimum days to first appearance of male flower were observed in Garima Super (31.92 days) followed by Joolie (32.00 days) and US-249 (32.25 days). Maximum days to first appearance of male flower were found in J.K. Manali (38.83 days). The days of first appearance of male flower plays an important role in deciding the earliness or lateness of crop in general. Minimum days to first appearances of female flower were observed with Garima Super (35.83 days) followed by LG-40 (36.42) and US-249 (36.83 days). Maximum days were recorded to first appearance of female flower with Dash (39.83days). The number of days from sowing to first appearance of female flower is an important character that indicates earliness or lateness of the crop in general. The variation in first appearance of male and female flower might have

been due to internodal length, number of internodes, genetic nature, environmental factor and vigour of the crop. Similar results have been reported by Sahni *et al.* (7) in ridge gourd, Badgurjar and More (2) and Bairagi *et al.* (3) in cucumber. Minimum node number at which first male flower appeared were observed in Garima Super (3.42 node) followed by Manvi Plus (4.00 node) and US-249 (4.08 node). Maximum node number at which first male flower appeared was in R.K.-180 (6.25nodes). Minimum node number at which first female flower appeared was recorded in Garima Super (4.83 node) followed by Alisha (4.92node) and US-249 (5.25 node). Maximum node number at which first female flower appeared was in Joolie (7.42 node). The variation in node number at which first male and female flower appears might have been due to specific genetic makeup of different hybrids and prevailing environmental conditions. Similar results have been reported by Bairagi *et al.* (3) and Sharma and Bhattarai (8) in cucumber. Maximum number of male flowers per vine was recorded in Garima Super (206.33) followed by Hybrid-512 (194.5) and US-249 (163.42). The minimum number of male flowers per vine was found in hybrid Mala (103.83). Maximum number of female flowers per vine was found with Garima Super (29.17) followed by LG-40 (25.58) and US-249 (23.67). The minimum number of female flowers per vine was recorded in Hybrid-512 (13.83). The variation in number of male and female flowers per vine might have been due to their genetic makeup, environmental factor, hormonal factor and vigour of the crop. Similar results have been reported by Solanki and Seth (9), Rastogi *et al.* (6) and Bairagi *et al.* (3) in cucumber.

Data presented in Table 2 revealed that the maximum number of fruits per vine was recorded in Garima Super (13.83) followed by LG-40 (12.42) and US-249 (11.17). The lowest number of fruits per vine was recorded in Hybrid-512 (8.33). The number of fruits per vine is one of the major factors for deciding the yield of the crop. The variation in number of fruits per vine might have been due to

Table 1: Mean performance of different hybrids of cucumber (*Cucumis sativus* L.) in growth yield and quality.

Hybrids	Vine length (cm)	Number of branches per vine	Days to first appearance of male flower	Days to first appearance of female flower	Node number at which first male flower appears	Node number at which first female flower appears	Number of male flowers per vine	Number of female flowers per vine
Joolie	212.33	7.42	32.00	39.00	5.00	7.42	125.75	19.50
F ₁ Fumiko-10	207.08	9.25	34.33	39.42	5.75	6.33	123.50	14.92
R.K-180	198.75	9.83	33.25	36.92	6.25	5.67	146.92	17.17
J.K. Manali	195.83	8.42	38.83	38.83	5.00	5.50	125.00	21.67
Dash	201.25	9.33	34.42	39.83	4.50	5.58	123.08	22.00
Khioudon	212.10	8.67	32.75	38.33	4.83	5.83	130.42	22.92
Manvi Plus	193.75	8.00	34.17	38.92	4.00	6.33	121.58	14.67
Alisha	215.42	10.67	32.67	37.17	4.17	4.92	157.17	23.65
Noori	195.00	8.92	35.08	38.42	4.75	7.33	143.67	20.42
LG- 40	237.92	10.00	34.17	36.42	4.75	5.33	128.92	25.58
Hybrid Mala	202.08	9.92	34.83	38.75	4.67	5.42	103.83	17.00
Agro Priya	183.75	9.08	36.08	39.19	5.50	7.17	112.42	21.83
Prasad-100	199.58	9.17	34.92	38.88	4.75	6.50	127.83	22.25
Hybrid- 512	212.08	7.33	37.00	39.25	5.92	6.33	194.50	13.83
Sheetal	201.67	7.83	35.17	38.83	6.08	6.25	138.17	18.67
Taksin	188.23	9.50	36.00	39.17	5.58	6.25	129.50	21.83
Kanene	193.75	7.92	34.25	37.00	5.08	5.58	134.67	21.08
NCH-2	205.00	8.67	32.83	38.75	5.00	5.42	125.50	22.67
US-249	222.92	10.50	32.25	36.83	4.08	5.25	163.42	23.67
Garima Super	249.17	11.42	31.92	35.83	3.42	4.83	206.33	29.17
C.D. (P=0.05)	3.96	0.30	0.33	0.33	0.33	0.28	1.48	0.48

sex ratio, fruit set percentage, genetic nature and their response to varying environmental conditions. Variation in number of fruits per vine was also reported by Nag *et al.* (5) in invy gourd and Srivastava and Srivastava (10) in bitter gourd. Maximum fruit diameter was recorded in Garima Super (4.03cm) followed by Joolie (3.99 cm) and US-249 (3.98 cm). The minimum fruit diameter was found in Hybrid-512 (3.49 cm). Increasing in fruit yield is mostly influenced by fruit diameter. The fruit diameter will be high then automatically fruit yield will be also high. Significantly maximum fruit length was recorded in Garima Super (19.58 cm) followed by LG-40 (18.75 cm) and US-249 (18.17 cm). The minimum fruit length was recorded with J. K. Manali (12.75 cm). The variation in fruit length and diameter might have been due to genetic nature, environmental factor and vigour of the crop Ahamed *et al.* (1) and Rastogi *et al.* (6) have also

reported similar findings in cucumber. Garima Super (168.33g) showed significantly maximum fruit weight followed by LG-40 (167.33g) and US-249 (166.17g) and the lowest fruit weight was found in Hybrid-512 (141.25g). The higher fruit diameter and higher fruit length result in to higher fruit weight. The highest fruit weight in Garima Super may be due to its hybrid vigour and adoptability to Allahabad agro-climatic conditions confirming to findings of Prasad (5) in bottle gourd. Minimum days to first fruit harvest from sowing was found with Garima Super (44.83 days) followed by Alisha (46.67 days) and US-249 (46.92). Hybrid Joolie (50.25 days) had taken very much time to first harvesting. The variation in days to first fruit to harvesting might have been due to genetic factor, environmental factor, hormonal factor and vigour of the crop. Significantly maximum yield per vine (Table 2) was recorded in

Table 2: Mean performance of different hybrids of cucumber (*Cucumis sativus* L.) in growth yield and quality.

Hybrids	Number of fruits per vine	Fruit diameter (cm)	Fruit length (cm)	Fruit weight (g)	Days to first fruit harvest	Fruit yield per vine (kg)	Fruit yield (t ha ⁻¹)	Total soluble solids (°Brix)	Vit-C (mg / 100 g)
Joolie	9.72	3.99	16.17	165.08	50.25	1.60	25.76	4.42	6.92
F1 Fumiko-10	9.33	3.72	15.67	155.00	49.25	1.47	23.13	4.75	6.92
R.K.-180	9.67	3.63	15.25	152.67	48.75	1.39	21.85	4.58	6.83
J.K. Manali	8.42	3.94	12.75	159.50	49.75	1.41	22.45	4.25	6.67
Dash	10.50	3.80	15.75	162.50	48.75	1.68	27.28	4.76	6.75
Khioudon	9.00	3.64	15.00	151.25	49.75	1.37	21.80	4.60	6.67
Manvi Plus	9.27	3.80	16.00	159.83	49.75	1.34	21.30	4.61	6.42
Alisha	11.00	3.96	18.00	165.25	46.67	1.71	27.84	5.25	7.08
Noori	9.75	3.61	16.58	150.75	49.75	1.48	23.50	4.08	6.92
LG-40	12.42	3.94	18.75	167.33	47.17	1.99	31.72	5.08	7.23
Hybrid Mala	9.00	3.52	17.08	146.83	49.50	1.49	23.94	5.09	6.83
Agro Priya	9.25	3.61	13.75	151.00	49.50	1.41	22.35	5.00	6.92
Prasad-100	10.33	3.85	17.33	161.17	49.08	1.67	25.84	5.36	6.92
Hybrid-512	8.33	3.49	17.58	141.25	49.75	1.31	20.41	4.50	6.25
Sheetal	8.58	3.50	15.42	148.58	49.25	1.42	22.56	4.75	6.92
Taksin	9.42	3.66	16.00	153.67	49.50	1.44	23.15	4.93	6.83
Kanene	9.92	3.64	17.92	155.33	50.00	1.54	24.62	4.92	6.92
NCH-2	8.92	3.63	16.25	152.67	49.83	1.36	21.81	4.59	6.58
US-249	11.17	3.98	18.17	166.17	46.92	1.80	28.79	5.33	7.25
Garima Super	13.83	4.03	19.58	168.33	44.83	2.24	36.24	5.50	7.28
C.D. (P=0.05)	0.21	0.06	0.36	0.98	0.56	0.05	0.35	0.24	0.22

Garima Super (2.24 kg) followed by LG-40 (1.99 kg) and US-249 (1.8 kg). The lowest fruit yield per vine was found in Hybrid-512 (1.31kg). The variation in fruit yield per vine (kg) might have been due to fruit set percentage, fruit length, number of fruits per vine, fruit weight, fruit width, genetic nature, environmental factor and vigour of the crop. These findings are in close conformity with findings of Sharma and Bhattarai (8) in cucumber and Srivastava and Srivastava (10) in bitter gourd. Garima Super recorded maximum yield (36.24 t ha⁻¹) followed by LG-40 (31.72 t ha⁻¹) and US-249 (28.7 t ha⁻¹). The lowest yield was found in Hybrid-512 (20.417 t ha⁻¹). The significant variation in fruit yield might have been due to number of fruits per vine and yield per vine. Similar results have also been reported by Rastogi et al. (6) and Yadav *et al* (11) in cucumber, Sahni *et al.* (7) in ridgegourd.

Significantly maximum T.S.S. was found with Garima Super (5.50°Brix) followed by Prasad-10 (5.36°Brix) and US-249 (5.33°Brix). The minimum TSS value was found with Noori (4.08°Brix). The higher TSS value in Garima Super may be due to its inherent characteristics. Maximum vitamin 'C' was found with Garima Super (7.28 mg) followed by LG-40 (7.23 mg) and US-249 (7.25 mg). The lowest vitamin 'C' mg/100g was found with Dash (6.25mg).

Sensory evaluation was done for overall performance of cucumber hybrids on the basis of their colour, aroma, texture, taste, flavour and overall acceptability of cucumber fruits (Table 3). Among 20 hybrids, Garima Super was found to be the best for colour on the basis of sensory evaluation which secured highest score (7.44) on 9.0 hedonic scale followed by Joolie (7.33) and

Table 3: Organoleptic scores for fruits of different hybrids of Cucumber (*Cucumis sativus* L.).

Hybrids	Colour	Aroma	Texture	Taste	Flavour	Overall acceptability
Joolie	7.33	7.17	7.44	7.75	7.22	7.33
F ₁ Fumiko-10	6.67	6.67	6.00	6.00	6.33	6.33
R.K.-180	7.00	6.67	6.00	6.33	6.00	6.40
J.K. Manali	6.67	6.67	6.33	6.33	6.67	6.53
Dash	6.33	5.67	6.33	6.67	6.00	6.20
Khioudon	6.33	6.33	6.33	5.67	6.00	6.13
Manvi Plus	6.00	6.67	6.67	5.67	6.33	6.27
Alisha	7.00	7.00	7.00	7.00	7.00	7.00
htNoori	6.00	6.33	6.33	6.67	6.33	6.33
L-40	6.67	6.67	6.67	6.00	6.67	6.53
Hybrid Mala	6.33	6.67	6.00	6.33	6.33	6.33
Agro Priya	6.33	6.44	6.33	6.67	5.67	6.29
Prasad-100	6.67	5.67	6.00	6.67	6.67	6.33
Hybrid-512	6.33	6.00	6.00	6.67	6.33	6.27
Sheetal	6.33	6.33	6.33	6.00	6.67	6.33
Taksin	6.33	6.33	6.00	6.33	6.00	6.20
Kanene	6.33	6.67	6.00	5.67	6.67	6.27
NC-2	6.00	6.33	6.33	6.67	6.33	6.33
US-249	7.17	7.11	7.33	7.33	7.11	7.21
Garima Super	7.44	7.67	7.67	7.67	7.67	7.62
C.D. (P=0.05)	0.46	0.49	0.42	0.51	0.50	0.23

US-249 (7.17). While, the minimum marks (6.00 each) was secured by both Manvi Plus and NCH-2. However, in case of aroma, Garima Super obtained highest (7.67) scores followed by Joolie (7.17) and US-249 (7.11) whereas, the minimum marks (5.67 each) were scored by Dash and Prasad-100 hybrids both. In case of texture, Garima Super obtained the highest (7.67) scores followed by Joolie (7.44), US-249 (7.33) and the minimum scores (6.00 each) was taken by F₁ Fumiko-10, R.K.-180, Hybrid Mala, Prasad-100, Hybrid-512 and Kanene. The highest scores for taste was observed in Garima Super (7.67) followed by Joolie (7.75) and lowest scores (5.67 each) in Khioudon, Manvi Plus and Kanene. In case of flavour, Garima Super obtained highest marks (7.67) followed by Joolie (7.72) and US-249 (7.11) while, minimum marks (5.67) was recorded in Agro Priya. In case of overall acceptability, Garima Super achieved highest

scores (7.62) followed by Joolie (7.73) and US-249 (7.21) whereas, minimum scores (6.13) was obtained by Khioudon.

Hybrid Garima Super recorded maximum gross return (289,955 Rs. ha⁻¹) as well as net return (211, 090 Rs. ha⁻¹). The highest cost benefit ratio (1: 3.68) was obtained in Garima Super followed by LG -40 (1: 3.18).

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