

EVALUATION OF GROWTH AND YIELD POTENTIAL OF CUCUMBER (*CUCUMIS SATIVUS* L.) VARIETIES UNDER VALLEY CONDITION OF GARHWAL HILLS

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Abstract – The present research was accomplished on different varieties of Cucumber to investigate the growth and yield potential of these varieties under valley condition of Garhwal Hills. The experiment was conducted in randomized block design and replicated 3 times with 22 treatments. The significant increase in first seed germination (7.66 days) was recorded under the variety Super Green (T₁₀). The findings clearly indicate that the length of vine 30 DAS, 60 DAS and at harvest the variety Poinsett (T₁₇), was recorded significantly maximum plant height (45.46 cm), (160.00 cm) and (501.00 cm) respectively. The maximum diameter of vine (1.23 cm) was recorded in variety Green Long (T₂). The maximum number of primary branches per vine, maximum number of primary nodes per vine, minimum days taken to first opening of female and male flowers, minimum days (42.33 days) taken to first harvest, minimum number of nodes bearing first female and male flower; maximum sex ratio; maximum fruit per vine; maximum fruit weight, maximum duration of harvesting and highest total fruit yield per vine were recorded in variety Poinsett (T₁₇). The maximum length of fruit (19.74 cm) was recorded in variety Green Long (T₂).

INTRODUCTION

Cucumber is one of the most significant cucurbitaceous vegetable crops in the nation and is widely cultivated in tropical and subtropical regions. Cucurbits occupy a unique position among many vegetable crop groups. In cucurbits, cucumber is important vegetable crop from economic point of view. In Asia, it is the fourth most important vegetable crop after tomato, cabbage, and onion and second widely cultivated cucurbit after watermelon (Wehner, 2007). Cucumber is also known as Khira (in Hindi), Kandalu (in Sanskrit), Kiyar (in Urdu), Thabi (in Manipuri), and Dosa Kaya (in Telegu). Cucumber is an annual monoecious vine plant, it is chosen as a cooked vegetable, pickled food, and an ingredient in salads during the summer. It is supposed to provide a cooling effect, prevent constipation, treat jaundice, ease indigestion, and have both cosmetic and therapeutic benefits.

The existing study variable of horticulture traits in cucumber for identified and promoted a specific high yield potential and suitable variety for commercial cultivation in Garhwal hills. For this work estimate the growth and flowering parameters contributing to the performance of 22 different varieties.

MATERIALS AND METHODS

The current study, "Evaluation of growth and yield potential of cucumber (*Cucumis sativus* L.) varieties under valley condition of Garhwal hills," was carried out in 2015 during the *zaid* season at the Horticulture Research Center, Chauras Campus, Department of Horticulture, H.N.B. Garhwal University, Srinagar Garhwal, Uttarakhand, India. Srinagar (Garhwal) is located in the heart of Alaknanda valley (30° 47' 30" E longitude and 30° 13' 0" N latitude and at an elevation of 540 m above

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MSL). The region exhibits a semi-arid, subtropical climate with dry summer and rigorous winter with occasional dense fog in the morning from mid-December to mid February. The materials for the present investigation consist of 22 varieties *viz.*, Dharwad Green, Green Long, Green Wonder, Hill Kakri, Inder Jeet, J.K. Spl, Kheti Bari, Local-1, Local-2, Local-3, Local-4, Local-5, Local-6, Local-7, Parsad Kheera-40, Parsad Kheera-100, Poinsett, Puna Kheera, Super Green, Tapan, Vinayak and White Cucumber collected from different regions of India. The experiment was laid out in accordance with Randomized Block Design comprising of 22 varieties and three replications. The experimental area was divided into three blocks of equal size and each block consist of 22 plots of equal size. Each plot measured 4.5 m² areas with 1.0 m x 30 cm spacing. The seedling transplanting after 25-30 days of sowing at four leaves stage. All the cultural practices were same for all the varieties used. Five plants were randomly selected from each plot per replication for recording the observations data on growth and flowering parameters and subjected to statistical analysis. The obtained data were analyzed using analysis of variance (ANOVA) under RBD following the procedure as stated by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The days to first seed germination was recorded minimum (3.00 days) in variety Poinsett (T₁₇) and Parsad Kheera-40 (T₁₅) respectively, whereas the maximum (7.66 days) days to seed germination was recorded in the variety Super Green (T₁₉). The variation of germination in seeds of cucumber in the different varieties is due to soil condition, environmental factors and genetic potential of seed, which is directly related to seed germination, similar results were also confirmed by Dutta and Abu-saleha (1990) and Khan *et al.* (2015) in cucumber. The length of vine at 30 DAS was recorded the maximum length of vine (50.20 cm) in variety Poinsett (T₁₇), whereas the minimum length of vine (21.23 cm) was recorded in under the variety Vinayak (T₂₁), the length of vine at 60 DAS was recorded the maximum length of vine (160.00 cm) in variety Poinsett (T₁₇), whereas the minimum length of vine (100.00 cm) was recorded in under the variety Parsad Kheera-40 (T₁₅) and plant height at harvest was found the maximum length of vine (511.66 cm) in variety Poinsett (T₁₇), whereas the

minimum length of vine (338.33 cm) was recorded in under the variety Vinayak (T₂₁). The variation in relation to length of vine for various cucumber cultivars might be affected by the environment to the great extent besides genetic potential, similar results were also confirmed by Kumar *et al.* (2017) in cucumber. The maximum diameter of vine (1.23 cm) was recorded in variety Green Long (T₂), which was found to be significantly variation among 22 varieties. On the other hand, the minimum diameter of vine (0.86 cm) was found in the variety Parsad Kheera-40 (T₁₅). Vine diameter depends upon soil conditions, nutrients concentration in soil, genetic makeup and environmental factors. This finding was also suggested by Soleimani and Ahmadikhah (2009) in cucumber. The maximum number of primary branches per vine (7.66) was recorded in variety Poinsett (T₁₇). On the other hand, minimum number of primary branches per vine (4.00) was recorded in the variety Green Wonder (T₃), Vinayak (T₂₁) and White Cucumber (T₂₂) respectively. Number of primary branches depends upon soil conditions, nutrients concentration in soil, genetic makeup and environmental factor. This finding was also suggested by Soleimani and Ahmadikhah (2009) in cucumber. The maximum leaf area (331.50 cm²) was recorded in variety Green Long (T₂). The minimum 275.25 cm² leaf area was recorded under the variety Local-6 (T₁₃). The leaf area is an important character as the leaves are the plant factories for manufacturing photosynthesis. Therefore, the cultivar with more leaf area generally gives high yields. These results obtained are accordance with the finding of Hossain *et al.* (2010) and Golabadi *et al.* (2012) in cucumber.

The minimum days taken to first opening of male flower (34.33 days) was noticed in variety Poinsett (T₁₇), while the maximum days taken to first opening of male flower (45.66 days) was observed under the Dharwad Green (T₁). Therefore, the variety with early opening of male flower generally gives high yield. These results obtained are accordance with the finding of Hanchinamani *et al.* (2008) in cucumber. The minimum number of nodes bearing first male flower (4.33) was recorded in variety poinsett (T₁₇), while the maximum number of nodes bearing first male flower (6.20) was recorded under the Vinayak (T₂₁). Therefore, the variety with early bearing of male flower generally gives high yield. These results obtained are accordance with the finding of Hanchinamani *et al.* (2008) and Harika *et al.* (2012) in cucumber. The

minimum days taken to first opening of female flower (28.00 days) was noticed in the variety Poinsett (T₁₇), while the maximum days taken to first opening of female flower (59.33 days) was observed under the Dharwad Green (T₁). Therefore, the variety with early opening of male flower generally gives high yield. These results obtained are in accordance with the finding of Sundaram (2006) and Bisht *et al.* (2011) in cucumber. The minimum number of nodes bearing first female flower (4.33) was recorded in variety poinsett (T₁₇), while the maximum number of nodes bearing first female flower (8.66) was recorded under the Local-7 (T₁₄). Therefore, the variety with early bearing of female flower generally gives high yield. These results obtained are in accordance with the finding of Hanchinamani *et al.* (2008) and Bisht *et al.* (2011) in cucumber. The minimum sex ratio (1:6) was recorded in the variety Local-3 (T₁₀) and Local-3 (T₁₄) respectively, while higher sex ratio

Table 1. Performance of Cucumber Varieties for Growth and Flowering Parameters

Sl. No.	Varieties	Days to first seed germination	Length of Vine at 30 DAS	Length of Vine at 60 DAS	Length of Vine at harvest DAS	Diameter of vine (cm.)	Number of primary branches per vine	Number of nodes per vine	Leaf area (cm ²)	Days taken to first opening of male flower	Number of nodes bearing first male flower	Days taken to first opening of female flower	Number of nodes bearing first female flower
1	Dharwad Green	6.66	24.20	138.00	350.00	0.99	5.33	22.00	294.25	45.66	5.76	59.33	8.33
2	Green Long	3.33	45.46	150.00	501.00	1.23	7.33	26.66	331.50	35.33	4.73	29.66	5.33
3	Green Wonder	6.33	24.23	144.00	373.33	0.99	4.00	19.33	306.00	44.33	5.06	51.00	7.33
4	Hill Kakri	7.33	28.53	144.00	363.33	1.01	6.33	19.33	308.75	44.00	5.76	41.66	7.33
5	Inder Jeet	5.66	26.06	146.00	401.66	1.00	6.66	25.66	306.75	42.33	5.20	46.66	6.33
6	J.K. Spl	4.33	25.03	140.00	371.66	1.02	6.00	21.33	302.00	43.00	4.86	44.00	7.33
7	Kheti Bari	3.33	25.70	124.00	343.33	1.04	4.33	25.33	304.25	42.00	5.80	40.66	7.33
8	Local-1	5.00	27.40	110.00	356.66	1.13	4.66	21.00	302.75	40.33	5.50	41.00	6.66
9	Local-2	3.33	27.83	130.00	360.00	0.89	6.00	20.66	305.50	41.00	6.10	40.66	7.33
10	Local-3	7.33	24.83	145.00	348.33	0.96	4.33	21.00	313.25	43.00	5.23	36.00	7.00
11	Local-4	4.33	28.46	130.00	383.33	1.03	6.00	24.66	310.25	42.33	5.06	45.33	8.00
12	Local-5	3.33	32.40	145.00	421.66	1.10	5.66	20.66	310.00	44.66	5.76	48.00	6.33
13	Local-6	5.00	31.93	135.00	400.00	0.98	4.33	19.00	275.25	44.33	5.50	43.33	7.00
14	Local-7	7.00	24.90	135.00	376.66	1.05	6.00	20.33	289.25	42.66	6.10	48.66	8.66
15	Parsad Kheera-40	3.00	28.36	100.00	353.66	0.86	5.00	23.66	303.25	40.66	5.16	39.66	7.33
16	Parsad Kheera-100	4.33	30.66	138.00	398.33	0.91	5.33	26.66	309.00	41.66	4.43	42.00	6.33
17	Poinsett	3.00	50.20	160.00	511.66	1.16	7.66	31.33	330.00	34.33	4.33	28.00	4.33
18	Puna Kheera	3.33	25.83	135.00	357.00	0.99	5.33	21.33	296.00	41.66	6.10	42.00	8.33
19	Super Green	7.66	32.56	138.00	386.66	0.97	6.00	25.00	306.75	45.33	5.16	48.00	7.33
20	Tapan	5.00	22.36	145.00	346.66	0.99	5.33	23.00	287.00	41.33	5.50	39.33	7.66
21	Vinayak	7.00	21.23	135.00	338.33	0.89	4.00	17.33	309.75	45.00	6.20	44.66	6.33
22	White Cucumber	5.66	26.90	135.00	361.66	1.00	4.00	23.00	309.00	41.00	4.86	32.00	7.33
	Mean	5.06	28.87	139.48	382.05	1.01	5.44	22.65	402.86	42.09	05.42	42.35	7.06
	S.E.m±	0.55	0.82	04.98	6.0	0.04	0.74	1.07	9.61	01.23	0.18	2.06	0.83
	C.D at 5%	2.08	2.33	14.21	17.11	0.13	2.10	3.06	27.44	03.52	0.50	5.87	2.37

(1:19) was observed in the variety Poinsett (T_{17}). These results were affected by variation in temperature and environment factors. The data are similar to the result of Yadav *et al.* (2002) in bitter gourd and Hanchinamani *et al.* (2008) in cucumber. The maximum days taken to first harvest was observed in the variety Poinsett (T_{17}), whereas the minimum days taken to first harvest were recorded in variety Local -1 (T_8) and Local -5 (T_{12}) respectively. This difference can be attributed to in cultivars and ecologically as well as climatic condition, similar results are in accordance with the findings of Sharma and Bhattarai, (2006) and Patel *et al.* (2013) in cucumber. The variety Poinsett (T_{17}) showed significantly highest number of fruit per vine, whereas the minimum number of fruit per vine was recorded in variety Super Green (T_{19}), Local -3 (T_{10}) and White Cucumber (T_{22}) respectively. Differences among the cultivars may be due to genetic factors and their interaction to the environmental conditions. The similar results were reported by Hamid *et al.* (2002) in cucumber. The variety Poinsett

(T_{17}) showed significantly highest total fruit yield per vine, whereas the minimum total fruit yield per vine was recorded in variety Local -3 (T_{10}). Differences among the cultivars may be due to genetic factors and their interaction to the environmental conditions. The similar results were reported by Bisht *et al.* (2011) in cucumber. The maximum fruit length was recorded in variety Green Long (T_2), whereas the minimum length of fruit was recorded in variety Inderjeet (T_5) respectively. Environmental and genetic factors strongly effect on fruit length. So, different cultivars have different fruit length according to their behavior. The variety Poinsett (T_{17}) was recorded significantly maximum weight of fruit, whereas the minimum weight of fruit was recorded in variety Parsad Kheera- 100 (T_{16}). The variation in the weight of fruit might be due to the genetic variation. The present findings are in conformity with the work of Kumar *et al.* (2013) in cucumber. The maximum diameter of fruit was recorded in variety Poinsett (T_{17}), whereas the minimum diameter of fruit was

Table 2. Performance of Cucumber Varieties for Yield Parameters

Sl. No.	Varieties	Sex ratio	Days taken to first fruit harvest	Number of fruit/ vine	Total fruit yield per vine	Length of fruit	Weight of fruit	Diameter of fruit	Duration of harvesting	Fruit yield per plot
1	Dharwad Green	1:10	45.66	10.66	4.10	18.59	228.33	4.27	49.66	35.00
2	Green Long	1:13	44.00	13.33	6.13	19.74	251.66	5.10	63.00	52.33
3	Green Wonder	1:8	43.00	12.00	4.83	16.33	171.66	4.07	50.66	35.66
4	Hill Kakri	1:9	48.66	08.33	3.83	19.66	211.00	4.60	50.66	28.66
5	Inder Jeet	1:11	45.33	8.66	5.50	15.33	144.33	4.55	51.66	52.00
6	J.K. Spl	1:13	50.33	9.66	5.00	19.66	199.00	4.86	51.00	44.33
7	Kheti Bari	1:12	46.66	12.00	5.66	16.66	155.00	4.96	52.66	43.66
8	Local-1	1:7	54.33	09.33	3.66	17.66	165.00	4.62	50.00	25.66
9	Local-2	1:8	46.00	13.00	4.46	15.75	208.33	4.03	49.33	35.00
10	Local-3	1:6	47.00	06.33	2.46	19.33	211.66	4.10	46.33	19.33
11	Local-4	1:10	53.33	12.00	4.08	17.66	184.33	4.00	49.33	35.00
12	Local-5	1:10	54.33	09.00	4.20	19.66	204.33	4.56	50.66	34.66
13	Local-6	1:8	48.66	10.00	4.66	16.33	175.00	4.35	48.66	35.33
14	Local-7	1:6	48.33	09.00	3.83	18.66	199.00	4.63	52.66	28.33
15	Parsad Kheera-40	1:9	49.66	10.66	4.86	18.00	195.00	4.30	51.33	36.66
16	Parsad Kheera-100	1:9	52.00	11.33	4.96	17.36	154.66	4.20	50.66	38.66
17	Poinsett	1:19	42.33	14.00	6.93	18.60	254.33	5.26	64.33	60.00
18	Puna Kheera	1:15	49.33	8.33	3.20	19.33	208.00	4.05	52.33	28.66
19	Super Green	1:13	43.33	6.33	3.50	19.00	202.33	4.30	51.66	29.00
20	Tapan	1:7	39.33	11.00	4.70	17.00	175.00	4.63	50.00	36.33
21	Vinayak	1:9	43.33	10.33	4.16	18.66	182.33	4.37	50.66	39.33
22	White Cucumber	1:11	43.00	06.33	4.10	17.00	170.66	4.32	52.00	40.00
	Mean		47.09	10.08	4.47	17.95	193.23	4.52	51.79	36.98
	S.Em±		01.17	0.87	0.31	0.90	7.32	0.19	1.25	0.89
	C.D at 5%		03.34	2.48	0.89	2.58	20.89	0.53	3.57	2.53
			04.47	3.31	1.19	3.45	27.93	0.71	4.78	3.38

recorded in variety Local -4 (T₁₁). The variation in the weight of fruit might be due to the genetic variation. This finding was also suggested by Golabadi *et al.* (2012) in cucumber. The maximum duration of harvesting was recorded in variety Poinsett (T₁₇), whereas the minimum duration of harvesting was recorded in variety Local -3 (T₁₀). The variation in the duration of harvesting might be due to the genetic variation and their interaction to the environmental conditions. This finding was also suggested by Patel *et al.* (2013) in cucumber. The higher fruit yield per plot was obtained in variety Poinsett (T₁₇), whereas the minimum fruit yield was recorded in variety Local -3 (T₁₀). This may be due to genotype effects and the effect of environmental as well as agronomic conditions on quantity attributes. The similar results were reported by Sharma and Vidyasagar (2001), Zamin *et al.* (2002) and Kumar *et al.* (2013) in cucumber.

CONCLUSION

On the basis of results obtained from the present study, it may be concluded that Poinsett (T₁₇) variety of cucumber was found superior for Garhwal hills on the basis of growth, flowering yield parameters followed by Green Long (T₂). Hence, these varieties should be used to enhance the production of cucumber under Garhwal Hills.

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