



STUDIES ON VEGETATIVE GROWTH, FLOWERING BEHAVIOR AND SEED YIELD OF GREEN HOUSE CUCUMBER (*Cucumis sativus* L.)

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ABSTRACT

The field experiments were conducted at experimental farm of Indian Institute of Vegetable Research, Varanasi during two years i.e. 2007 and 2008 to find out the studies on vegetative growth, flowering behaviour and seed yield of green house cucumber cultivars. The experiments were laid out in Randomized Block Design with 12 cucumber varieties in three replications. Results showed that the variety of Prasad-10 is suitable for earlier flowering, anthesis of flower on lower node. The numerically higher fruit size of cucumber at all the stages was recorded in SPP-56 variety than rest used varieties in both years. The significantly highest seed weight at 14th to 42nd DAA were recorded but numerically higher seed size of cucumber in variety of SPP-56 than remaining varieties of cucumber during both the years. Maximum fresh weight of vine was noted under cv. Pusa sanyog at 14th DAA while, at 28th and 42nd DAA maximum fresh weight was associated with cultivar Ranchi-3 during both the years whereas, maximum dry weight of vine was noted under cv. NH-150 at 28th DAA than other rest varieties of cucumber during both the year, respectively.

Key Words : vegetative growth, flowering behaviour, green house cucumber, cultivars.

Cucumber (*Cucumis sativus* L.) is a popular summer vegetables of North and South India and lower as well as high hills in India. Cucumber seeds have a number of Ayurvedic uses. According to the Unani system of medicine, the oil from its seed is good for the brain and the body. Cucurbits play an important role in human diet among the vegetables. The exact statistics on area and production of cucurbits are not available. However, as per FAO estimates the world average of

watermelon, cucumber and gherkins, melons and pumpkin, squashes and guard is about 7.77 million hectares with total production of 156 million tones. In India, the area under cucurbits is estimated to be 0.43 million hectares with the production of 4.5 million tones.

The optimum stage of harvest for good yield of quality seed is not specified. A grower entire crop depends on the quality of seed used for sowing. Since apart from various factors affecting seed quality, the

variation in quality attributes of seed is direct or indirect result of variation in their harvesting stages also it becomes imperative to underline the optimum stage of harvesting of fruits for obtaining quality seed. Hence, the present investigation was done with the objective to find out optimum harvesting stage for good quality seeds of cucumber along with generating information on its flowering behavior.

MATERIALS AND METHODS

The experiment was conducted at Research Farm of Indian Institute of Vegetable Research, Varanasi during the year 2007 and 2008. The soil of experimental plots under Polly house condition sandy loam with average fertility level in nature having ph 6.9, available N-260 kg/ha, P-10.31 kg/ha and K-217.24 kg/ha and E.C. 282 mm hos/cm. Twelve varieties or treatments viz. C.H.-20, Prasad-10, C.H.-24, Pusa Sanyog, SPP-44, NH-150, Patana, Ranchi-3, Point Set, Green long, Swerna Ageti and SPP-56 were applied. The experiment was laid out in Randomized Block Design with three replications. Land of the Polly house has prepared by digging with spade followed by three hoeing. After field preparation plots of above mentioned dimensions were carried out as per layout. Seed to seed distance was maintained 30cm. Observations were recorded on vegetative growth, flowering behavior and seed yield of cucumber.

RESULTS AND DISCUSSION

Flower behavior

An examination of data presented in Table-1 clearly indicated that the significantly minimum duration of 33 and 34days on main branch and 35 and 36 days on secondary branch for emergence of first male flower in respect to cv., Prasad-10 over rest varieties of cucumber but at par SPP-44, Swerna Ageti and SPP-56, respectively during both the year. While, the maximum period for the same were 41 and 42 days on main branch and 43 and 45 days on secondary branch in variety Pusa Sanyog of cucumber for both respective years. Significantly earlier flowering were noted under cv., Prasad-10 i.e. 37 and 39 days on main branch and

Table 1 : Durations for emergence of first male and female flower and node to first male and female flower (days) on main and secondary branch as influenced by cucumber varieties during both the years.

Treatments	Emergence of first male flower:						Emergence of first female flower:						Node to first male flower:						Node to first female flower:					
	Main branch		Secondary branch		Main branch		Secondary branch		Main branch		Secondary branch		Main branch		Secondary branch		Main branch		Secondary branch		Main branch		Secondary branch	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
C.H.-20	36	37	38	39	40	41	42	43	44	45	49	48	47	46	45	44	43	42	41	40	39	38	37	36
Prasad-10	33	34	35	36	37	39	39	41	42	43	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
C.H.-24	39	40	41	42	43	44	45	46	47	48	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Pusa Sanyog	41	42	43	45	45	46	47	48	49	50	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
SPP-44	35	36	37	38	39	40	41	42	43	44	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
NH-150	39	40	41	42	43	44	45	46	47	48	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Patana	36	37	38	39	40	41	42	43	44	45	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
Ranchi-3	37	38	39	40	41	42	43	44	45	46	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Point Set	38	39	40	41	42	43	44	45	46	47	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Green Long	36	37	38	39	40	41	42	43	44	45	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Swerna Ageti	35	36	37	38	39	40	41	42	43	44	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
SPP-56	34	35	36	37	38	39	40	41	42	43	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
SE (d)	1.18	1.18	1.18	1.20	1.21	1.23	1.29	1.28	1.28	1.28	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
CD at 5%	3.45	3.37	3.47	3.52	3.55	3.61	3.79	3.74	3.74	3.74	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54

39 and 41 days on secondary branch than rest used varieties of cucumber, respectively and the maximum period of 45 and 46 days on main branch and 47 and 48 days on secondary branch were noted with cv., Pusa Sanyog during 2007 and 2008, respectively. The earlier flowering on lowest number of nodes to first male flower i.e. 3.3 and 3.5 on main branch and 5.3 and 5.6 on secondary branch, were noted in cv., Prasad-10, which was significantly lower to the rest varieties during 2007 and 2008, respectively. While, next lowest node in next variety of Swerna Ageti i.e. 4.1 and 4.5 on main branch and 6.6 and 7.1 on secondary branch were produce to first male flower during both respective years of investigation. Significantly lowest nodes to first female flower in main (5.0 and 5.1) and secondary branches (8.0 and 8.1) were recorded in Prasad-10 variety than other rest varieties of cucumber in first and second years, respectively. Whereas, next lowest node in next variety of Swerna Ageti which is 6.2 and 6.8 on main branch and 9.9 and 10.7 on secondary branch in both the years of study. The highest nodes to first male and first female flower at main and secondary branch were recorded in Pusa Sanyog variety of cucumber. As the cucumber being the monocious plant of family cucurbitaceous early appearance of male flower than female flowers have been observed whereas, Suthar et al. (2007) reported that the pruning induced first pistillate flower earlier and lower nodes in cucumber hybrids and pruning resulted in production of maximum number of pistillate flowers in Pusa Sanyog.

Fruit Development :

Data showing diameter of fruits, 100 seed weight and size of seeds at varying days after anthesis (DAA) have been portrayed in Table-2. All attributes were taken 3 times at fortnight (15 days) intervals. The fruit size of cucumber was significant at initial stage of 14th days after anthesis. However, on later stages from 21st to 42nd DAA there were no significant differences among diameter of fruits of different cucumber varieties. The range of diameter of fruits during 2007 and 2008 at 14th, 28th and 42nd days after anthesis were 2.37-3.13, 3.30-3.77 and 6.00-6.27 and 2.49-3.29, 3.47-

Table 2 : Diameter of fruits, 100- seed weight and size of seeds at varying days after anthesis as influenced by cucumber varieties during both the years.

Treatments	Diameter of fruits (cm) at						100 seeds weight (g)						Size of seeds (cm)					
	14DAA		28DAA		42DAA		14DAA		28DAA		42DAA		14DAA		28DAA		42DAA	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
C.H.-20	2.53	2.66	3.40	3.57	6.10	6.41	7.40	7.77	8.80	9.24	16.10	16.91	0.51	0.53	0.49	0.51	0.44	0.46
Prasad-10	2.53	2.66	3.80	3.99	6.23	6.55	7.33	7.70	8.63	9.07	16.10	16.91	0.52	0.54	0.49	0.51	0.43	0.46
C.H.-24	2.73	2.87	3.53	3.71	6.20	6.51	7.37	7.74	8.90	9.35	16.37	17.19	0.51	0.53	0.49	0.51	0.43	0.45
Pusa Sanyog	2.80	2.94	3.43	3.61	6.20	6.41	7.23	7.60	8.73	9.17	15.87	16.66	0.46	0.48	0.45	0.47	0.40	0.42
SPP-44	2.53	2.66	3.30	3.47	6.17	6.48	7.23	7.60	8.93	9.38	15.93	16.73	0.46	0.48	0.45	0.47	0.40	0.42
NIH-150	2.37	2.49	3.47	3.64	6.10	6.41	7.60	7.98	8.83	9.28	16.37	17.19	0.51	0.53	0.49	0.51	0.43	0.45
Patana	2.70	2.84	3.43	3.61	6.00	6.30	7.60	7.98	9.00	9.45	16.23	17.05	0.52	0.54	0.48	0.51	0.42	0.44
Ranchi-3	2.40	2.52	3.40	3.57	6.27	6.58	7.47	7.84	9.03	9.49	16.10	16.91	0.52	0.54	0.49	0.51	0.43	0.46
Point Set	2.63	2.77	3.67	3.85	6.17	6.48	7.60	7.98	9.03	9.49	16.10	16.91	0.51	0.53	0.52	0.53	0.44	0.47
Green Long	2.77	2.91	3.50	3.68	6.07	6.37	7.43	7.81	9.37	9.84	16.77	17.61	0.51	0.54	0.49	0.52	0.45	0.48
Swerna Ageti	2.60	2.73	3.60	3.78	6.13	6.44	7.50	7.88	9.33	9.80	16.03	16.84	0.52	0.54	0.50	0.52	0.46	0.49
SPP-56	3.13	3.29	2.77	3.96	5.90	6.20	8.63	9.07	9.47	9.94	16.83	17.68	0.54	0.56	0.51	0.54	0.46	0.49
SE (d)	0.06	0.08	0.08	0.10	0.08	0.12	0.15	0.13	0.14	0.17	0.18	0.20	0.02	0.02	0.02	0.03	0.004	0.03
CD at 5%	0.17	0.23	NS	NS	NS	NS	0.43	0.39	0.42	0.50	0.52	0.58	NS	NS	NS	NS	NS	NS

3.96 and 6.30-6.58 cm, respectively. The numerically higher fruit size of cucumber at all the stages was recorded in SPP-56 variety than rest used varieties in both years, respectively. The weight of 100 seeds was significant at all the stages in study year. The range of weight of seed during 2007 and 2008 at 14th, 28th and 42nd days after anthesis were 7.23-8.63g, 8.73-9.47g and 15.93-16.83g and 7.60 – 9.07g, 9.07 – 9.94g and 16.66- 17.68g, respectively. The significantly highest seed weight at 14, 28 and 42 DAA was recorded in variety of SPP-56 than remaining varieties of cucumber during both the years, respectively. It is clear from the table that all the varieties tested in present investigation were fail at all stages to show their significant impact on size of seeds. However, minor differences were noticed among the values of seed size but numerically higher size of seeds at all the stages was recorded in SPP-56 than other rest variety of cucumber during both the years of study. The maximum diameter of fruit was attributed with the greater accumulation of nutritional resources with the maturity of fruit. But the lowest male to female ratio achieved by both pruning as well as Ethrel application is an indicative for increasing fruit yield in cucumber by Suther et al. (2007), Kishore et al. (2010) and already similar workers by Cheshmehmanesh et al. (2004) and Ravi Kumar et al. (2005) reported that the seed yield and seed quality were higher in Kharif by

adopting narrow spacing, no nipping and retention of four fruits per vine.

Growth attributes under seed germinator :

Data on germination percentage of seed, total seedling length (cm), fresh and dry weight of seedling at different stages of cucumber under seed germinator have been portrayed in Table-3 and 4. The significant differences in germination of seeds of different cultivars under seed germinator were observed from 14th to 28th days after anthesis whereas, at later stage on 42nd days after anthesis there were no significant differences among germination of seeds of different cucumber varieties during both the years of study. It is evident from the table that there was gradual increase in the length of seedling with increasing age of crop from 14th to 42nd days after anthesis under seed germinator and maximum length of vine was noted under cv. SPP-56 at 14th DAA, CH-24 at 28 DAA and Prasad-10 at 42 DAA during 2007 and 2008, respectively. Minimum seedling length at all stages of crop was noted in variety of CH-20 during both the year of experimentations. Gradually increase in the fresh and dry weight of seedling under seed germinator with increasing age of crop from 14th to 42nd days after anthesis during both the years, respectively. Maximum fresh weight of vine was noted under cv. Pusa Sanyog at 14th DAA while, at 28th and

Table 3 : Germination (%) and Total seedling length (cm) at varying days after anthesis as influenced by cucumber varieties during both the years.

Treatments	Germination (%)						Total seedling length (cm)					
	14DAA		28DAA		42DAA		14DAA		28DAA		42DAA	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
C.H.-20	30.33	31.85	39.67	41.65	100.00	98.00	4.85	5.10	8.09	8.50	11.59	11.36
Prasad-10	31.00	32.55	44.67	46.90	100.00	98.00	8.87	9.36	10.08	10.58	14.01	13.73
C.H.-24	31.00	32.55	45.00	47.25	100.00	98.00	8.78	9.22	11.91	12.51	13.60	13.33
Pusa Sanyog	26.67	28.00	36.67	38.50	100.00	98.00	8.60	9.03	11.15	11.70	13.07	12.81
SPP-44	31.00	32.55	43.33	45.50	99.67	97.67	8.91	9.36	10.51	11.04	13.10	12.83
NH-150	31.33	32.90	49.00	51.45	99.67	97.67	9.41	9.88	10.72	11.26	11.64	11.31
Patana	33.33	35.00	44.67	46.90	100.00	98.00	7.76	8.20	10.34	10.85	12.19	11.95
Ranchi-3	30.67	32.20	47.00	49.35	99.67	97.67	9.34	9.81	10.87	11.38	12.21	11.97
Point Set	35.00	36.75	46.33	48.65	99.67	97.67	9.07	8.52	10.60	11.13	12.25	12.00
Green Long	31.67	33.25	46.67	49.00	100.00	98.00	9.58	9.92	10.81	11.35	12.12	11.87
Swerna Ageti	33.33	35.00	45.00	47.25	99.33	97.35	9.26	9.72	10.62	11.15	12.17	11.92
SPP-56	36.00	37.80	40.67	42.70	100.00	98.00	9.80	10.06	10.69	11.23	12.02	11.78
SE (d)	1.25	1.40	1.33	1.41	0.82	2.43	0.51	1.48	0.93	0.39	0.48	0.44
CD at 5%	3.66	4.09	3.89	4.15	NS	NS	1.50	1.42	1.25	1.15	1.41	1.28

Table 4 : Fresh and dry weight of seedling at varying days after anthesis as influenced by cucumber varieties during both the years.

Treatments	Fresh weight of seedling (g)						Dry weight of seedling (g)					
	14DAA		28DAA		42DAA		14DAA		28DAA		42DAA	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
C.H.-20	0.71	0.75	1.74	1.83	2.73	2.68	0.06	0.05	0.10	0.10	0.16	0.15
Prasad-10	0.77	0.81	0.95	1.00	3.03	2.97	0.04	0.04	0.11	0.11	0.16	0.15
C.H.-24	0.77	0.81	1.83	1.92	2.98	2.92	0.02	0.03	0.10	0.10	0.15	0.14
Pusa Sanyog	0.81	0.85	1.73	1.81	3.06	3.00	0.04	0.04	0.11	0.12	0.16	0.15
SPP-44	0.76	0.79	1.77	1.86	2.82	2.76	0.04	0.04	0.11	0.11	0.16	0.18
NH-150	0.75	0.78	1.76	1.85	2.96	2.90	0.04	0.05	0.12	0.13	0.18	0.17
Patana	0.76	0.80	1.91	2.00	2.97	2.91	0.03	0.03	0.06	0.07	0.16	0.15
Ranchi-3	0.75	0.79	2.07	2.17	3.10	3.04	0.04	0.05	0.09	0.10	0.16	0.16
Point Set	0.74	0.77	1.74	1.83	2.77	2.72	0.03	0.04	0.10	0.10	0.18	0.17
Green Long	0.73	0.77	1.69	1.77	2.77	2.71	0.05	0.05	0.11	0.12	0.17	0.16
Swarna Ageti	0.71	0.75	1.83	1.92	2.73	2.68	0.04	0.03	0.10	0.11	0.16	0.15
SPP-56	0.80	0.78	1.72	1.81	2.71	2.66	0.03	0.04	0.10	0.10	0.16	0.16
SE (d)	0.03	0.02	0.10	0.06	0.11	0.10	0.00	0.00	0.01	0.01	0.01	0.01
CD at 5%	0.10	0.06	0.29	0.19	0.39	0.30	NS	NS	0.02	0.03	NS	NS

42nd DAA maximum fresh weight was associated with cultivar Ranchi-3 during both the years, respectively. Dry weight of seedlings at initial stage on 14th DAA and later stage on 42nd DAA were not significantly differences among varying cultivars of cucumber, whereas, significant differences in dry weight of seedling under seed germinator of different cultivars was observed at 28th days after anthesis and maximum dry weight of vine was noted under cv., NH-150 at 28th DAA than that rest varieties of cucumber during both the year, respectively. Similar results were also reported by Shridhar (1994) and Dimitrov (2003) and Kishore et al. (2010) reported that the germination percentage was recorded lower in summer than Kharif whereas, higher soil water potential enhanced vegetative growth but the effect was not statistically significant each year by Suojala and Solo (2005).

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