



ISSN: 0974 - 0376

*The Ecoscan* : Special issue, Vol. IX: 323-327: 2016  
AN INTERNATIONAL QUARTERLY JOURNAL OF ENVIRONMENTAL SCIENCES  
[www.theecoscan.com](http://www.theecoscan.com)

## RESPONSE OF DIFFERENT VARIETIES OF CUCUMBER UNDER POLYHOUSE CONDITION

Swati Barche *et al.*,

### KEYWORDS

Varieties  
Cucumber  
Polyhouse  
Growth  
Yield and quality traits

Proceedings of National Conference on  
Harmony with Nature in Context of  
Resource Conservation and Climate Change  
(HARMONY - 2016)  
October 22 - 24, 2016, Hazaribag,  
organized by  
Department of Zoology, Botany, Biotechnology & Geology  
Vinoba Bhave University,  
Hazaribag (Jharkhand) 825301  
in association with  
NATIONAL ENVIRONMENTALISTS ASSOCIATION, INDIA  
[www.neaindia.org](http://www.neaindia.org)



SWATI BANCHE\*<sup>1</sup>, VINOD PATIDAR<sup>2</sup> AND KAMAL S. KIRAD<sup>3</sup>

<sup>1</sup>Rajmata Vijayaraje Scindhia

Krishi Vishwa Vidyalaya College of Agriculture, Indore - 452 001 (M.P.)

<sup>2</sup>Department of Horticulture, College Of Agriculture, Indore - 452 001 (M.P)

<sup>3</sup>Rajmata Vijayaraje Scindhia Krishi Vishwa Vidyalaya, Krishi Vigyan Kendra, Dhar - 454 001 (M.P.)

e-mail: sbkdap07@rediffmail.com

## ABSTRACT

The present investigation was conducted at , College of Agriculture, Indore (M.P.) during the year 2015-2016 to evaluate the performance of different cucumber genotypes under polyhouse condition for yield and its attributing characters. The experiment was laid out in Randomized Block Design with three replications. The observations were recorded on five randomly selected plants in each replication for each genotype on various traits. Observed data were statistically analyzed. Results revealed that the variety N.S.404 gave maximum seed germination percentage (86.33%) while the maximum vine length (190.00cm), number of leaves per plant (52.22), number of branches per plant (13.55) and leaf area (444.17cm<sup>2</sup>) recorded in Green Star-11. The significantly minimum inter-nodal distance (6.24cm) was recorded in variety Green Star-11, while, the maximum (9.74cm) was noted in Beit Alpha. The minimum days taken to first flowering (28.99), fruit initiation (34.22) and edible maturity (46.99) were recorded in Cucumber Dash. The variety Beit Alpha exhibited maximum fruit length (17.13cm) and fruit diameter (5.03cm). The maximum fruit weight (177.44g) was recorded in varieties American Black. Maximum yield (205.40 q/ha) was in Green Star -11. The same variety showed maximum total soluble solid (T.S.S.) percentage (4.83%) and overall acceptability (8.20) on the basis of sensory. It is concluded that the varieties Green Star-11 and Cucumber Dash responded well in terms of morphological, yield quality and phenological traits.

## INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the most important cross pollinated and popular monoecious, climbing vine vegetable crop (Bailey 1969). It is grown throughout the year in Southern states while, in plains of Northern India, it is grown during summer and rainy seasons and least grown in late kharif. Production of cucumber in India is mainly restricted to open field cultivation, resulting low yield and poor quality. While, polyhouse crop produce year round high value quality fruit with minimum incidence of disease and pest. Maximum growth, yield and superior quality of tomato obtained during summer season under polyhouse condition (Ughade, 2016). A germplasm collection with good variability for the desirable characters is the basic requirement of any crop improvement programme (Singhania *et al.*, 2006). Genetic makeup, environmental factor and age of the plant affect the number of fruits and size of the fruits which in turn is responsible for overall yield efficiency in chilli (Banche and Nair, 2014). In addition, crop improvement is primarily based on extensive evaluation of germplasm for a specific region. Keeping this in view, an attempt has been made to evaluate the morphological traits of the collected cucumber genotypes and evaluate under polyhouse condition to select the promising genotype (s) for higher yield.

## MATERIALS AND METHODS

The present investigation was conducted at College of Agriculture, Indore (M.P.) during the year 2015-2016 to evaluate the performance of different cucumber genotypes under polyhouse condition for yield and its attributing characters. The experiment was laid out in Randomized Block Design with three replications. The naturally ventilated poly house (784 m<sup>2</sup>) was oriented in North-South direction and covered with UV stabilized LDPE film of 200 micron thickness as cladding material. Ridge and furrow method was applied for sowing of cucumber. Beds of convenient size (length 24m, width 1m and height 20 cm) were prepared and the soil mixture of red soil + farmyard manure (20 tons/ha) were added during preparation. The beds were separated 60 cm apart to enable easy cultural operations. After application of formaldehyde, the entire soil in the polyhouse was immediately covered with black polythene sheet for one week and later they were removed. Sowing was done in the month of September in the hill of ridges at a depth of 2-3 cm. As the stem developed, it was trellised on the twine up to the height of horizontal wires (8-9 feet height) and then the vines were again turned downward direction. Observations on different growth and yield parameters were recorded from five randomly sampled plants from each treatment.

## RESULTS AND DISCUSSION

It is evident from the results presented in Table 1 that the different varieties of cucumber showed significant effect under polyhouse condition. Seed germination

\*Corresponding author

**Table 1: Growth parameters of different varieties of cucumber under polyhouse condition.**

Treatments (varieties)	Seed Germination (%)	Vine length (cm) 80DAS	Number of leaves per Plant80DAS	Number of branches per plant80DAS	Inter-nodal distance (cm)	Leaf area (cm <sup>2</sup> ) 80DAS
V1-N.S.404	86.33	156.89	41.55	11.10	7.93	421.68
V-2 Padmini	85.66	165.44	43.44	10.77	8.31	418.23
V-3 Beit Alpha	61.66	128.44	37.32	8.55	9.74	395.00
V-4Arya Pranita	78.33	163.43	43.89	10.10	8.45	423.64
V-5American Black	81.66	154.88	37.77	10.66	9.20	412.50
V-6 NSC 732 B	83.66	153.00	38.10	10.55	9.27	401.20
V-7 Sultan	80.33	154.10	41.66	10.77	8.13	408.12
V-8Cucumber Dash	84.66	182.88	46.77	11.99	7.61	435.88
V-9 Green Star -11	70.66	190.11	52.22	13.55	6.24	444.17
V-10 Maharaja	63.33	175.33	44.22	12.77	7.26	428.51
SEm ±	2.06	3.10	1.16	0.46	0.37	3.14
C.D. at 5% level	6.12	9.21	3.47	1.38	1.12	9.35

**Table 2: Phenological parameters of different varieties of cucumber under polyhouse condition.**

Treatments (varieties)	Days taken to first flowering	Days taken to first fruit initiation	Days taken to edible maturity	Average fruit length (cm)	Average fruit diameter(cm)	Fruit weight (g)	Number of fruits per plant
N.S.404	38.77	42.55	56.88	16.40	4.21	174.77	8.44
Padmini	39.99	44.77	57.66	16.03	4.06	158.55	7.99
Beit Alpha	39.55	45.66	61.88	17.13	5.03	177.44	4.99
Arya Pranita	30.99	36.88	48.77	14.55	4.64	157.77	8.99
American Black	38.99	45.33	63.66	14.77	3.73	141.11	7.88
NSC 732 B	36.44	41.44	61.11	14.01	4.36	159.77	6.88
Sultan	36.99	42.11	58.99	15.03	4.04	145.77	6.44
Cucumber Dash	28.99	34.22	46.99	16.25	4.16	166.66	9.66
Green Star -11	36.99	43.44	57.66	16.77	4.45	157.77	10.22
Maharaja	41.33	48.11	64.44	15.94	4.07	165.88	8.88
SEm ±	0.85	0.55	0.78	0.62	0.19	1.56	0.30
C.D. at 5% level	2.54	1.65	2.32	1.86	0.58	4.65	0.90

was recorded at ranges between 61.66-86.33%. The significantly maximum seed germination was recorded in the variety V<sub>1</sub>-N.S.404 (86.33%) while the minimum in genotype -Beit Alpha (61.66%). This variation may be due to genetic makeup of the cultivars which responded differently to the environmental conditions. Other researcher also observed that maximum germination percentage was in PARC-1 and minimum in Albeit *i.e.*, 72.3 and 48.2%, respectively. (Hamid, *et al.*, 2002). The highest vine length (190.11 cm) found in the variety V<sub>9</sub>-Green Star-11 and the variety V<sub>3</sub>-Beit Alpha recorded minimum (128.44 cm). It might be due to the inherent genetic makeup of the varieties, interaction with the microclimate prevails under polyhouse condition. The increase in vine length, may largely determined by cultivar characteristics. (Khan *et al.*, 2015).

The average number of leaves per plant at 80 days after sowing, the variety V<sub>9</sub>-Green Star-11 was found significantly superior (52.22) as compared to the rest of the varieties. Whereas, the variety V<sub>3</sub>-Beit Alpha was recorded minimum (37.32) leaves per plant. The leaf formation is associated with the length of plant. The vine length is directly proportionate to the number of leaf *i.e.*, the more will be vine length the greater will be leaf number. The more number of leaves in Green Star-11 were formed because of greater vine length and same proportion was observed in other cultivars, except American

Black where number of leaves per plant was formed comparatively less. (Ahmed *et al.*, 2004 ). As regards to 80 days after sowing, the variety V<sub>9</sub>-Green Star-11 was found significantly superior (13.55 branches) branches per plant whereas, the variety V<sub>3</sub>-Beit Alpha recorded minimum (8.55) branches per plant. The variation in number of branches per vine might have been due to its own genetic makeup and also due to vine length, inter-nodal length, hormonal factor and environmental factor. (Sharma and Bhattarai, 2006). The significantly minimum Inter-nodal distance was recorded in the variety V<sub>9</sub>-Green Star-11 (6.24 cm) whereas; maximum (9.74cm) in the variety V<sub>3</sub>-Beit Alpha. It is concluded that the reason for inter-nodal distance is a varietal character or it may be increased due to the different rates of photosynthesis and photosynthates supply for maximum growth. (Haque *et al.*, 2009)., Significantly superior leaf area (444.17 cm<sup>2</sup>) was found in the variety V<sub>9</sub>-Green Star -11 and minimum (395 cm<sup>2</sup>) was in the variety V<sub>3</sub>-Beit Alpha. Leaf area could be possibly due to genetic makeup of the cultivars, it was significantly increased by nitrogen, possibly because nitrogen helps in greater assimilation of food material by the plant which resulted in greater meristematic activities of cells and consequently the number of leaves, length and width of leaf of plant. (Parvej *et al.*, 2010).

As per the phenological traits showed in Table 2 that the days

**Table 3: Yield and quality traits of different varieties of Cucumber under polyhouse condition.**

Treat. Symb.	Treatments (varieties)	Fruit yield per hectare (q/ha)	T.S.S. (%)	Taste	Flavour	Overall acceptability
V <sub>1</sub>	N.S.404	179.10	4.53	4.20	4.30	4.25
V <sub>2</sub>	Padmini	157.90	3.76	6.30	6.40	6.35
V <sub>3</sub>	Beit Alpha	126.60	4.60	7.10	7.30	7.20
V <sub>4</sub>	Arya Pranita	176.60	3.70	7.00	7.10	7.05
V <sub>5</sub>	American Black	138.70	3.36	7.50	7.30	7.40
V <sub>6</sub>	NSC 732 B	136.60	4.23	7.20	7.40	7.30
V <sub>7</sub>	Sultan	130.00	3.38	5.40	5.10	5.25
V <sub>8</sub>	Cucumber Dash	196.70	4.11	7.80	7.60	7.70
V <sub>9</sub>	Green Star -11	205.40	4.83	8.30	8.10	8.20
V <sub>10</sub>	Maharaja	183.30	4.20	4.10	4.50	4.30
SEm ±		0.65	0.15			
C.D. at 5% level		1.95	0.45			

to first flowering recorded at ranges between 28.99-41.33 days after sowing. The significantly minimum days taken to flowering was 28.99 days after sowing in the variety V<sub>8</sub>-Cucumber Dash, whereas maximum in the variety V<sub>10</sub>-Maharaja (41.33 days). The variation in the days to first flowering might be due to genetic nature of the different varieties. It is desired character for early maturity and marketing of a crop. These results are similar with the results of research worker who stated that the cultivar Baby Long cucumber took minimum time (40 days) to start flowering. (Hamid *et al.*, 2002). Days taken to first fruit initiation recorded at ranges between 34.22-48.11 days after sowing. The significantly minimum days taken to fruit initiation was 34.22 days after sowing in the variety V<sub>8</sub>-Cucumber Dash while, maximum was recorded in the variety V<sub>10</sub>-Maharaja (48.44 days). Days taken to edible maturity recorded at ranges between 46.99-64.44 days after sowing. Significantly minimum days to edible maturity at 46.99 days after sowing were recorded in the variety V<sub>8</sub>-Cucumber Dash and maximum days in the variety V<sub>10</sub>-Maharaja (64.44 days). Significant difference of data for days to fruit initiation and edible maturity denoted that different genetic constitutions of the cultivars affected the performance of cultivars differently. The result are in accordance with the finding of few research workers. (Hamid *et al.*, 2002; Ahmed *et al.*, 2004; Parvej *et al.*, 2010; Khan *et al.*, 2015). Average fruit length and diameter recorded ranges between 14.01-17.13 cm and 3.73-5.03 cm, respectively. The variety V<sub>3</sub>-Beit Alpha was recorded the highest fruit length (17.13 cm) and the lowest (14.01 cm) in the variety V<sub>6</sub>- NSC 732 B. The average diameter of fruits of different varieties was significantly influenced under polyhouse condition. Highest diameter of fruits (5.03 cm) was recorded in the variety V<sub>3</sub>-Beit Alpha, whereas, the lowest (3.73 cm) was recorded in the variety V<sub>5</sub>- American Black. The variation in fruit length and diameter might have been due to genetic nature, environmental factor and vigour of the crop. (Tekale *et al.*, 2014). It is revealed that the fruit weight of different varieties was significantly influenced under polyhouse condition. The variety V<sub>3</sub>-Beit Alpha was found significantly superior (177.44 g) which was followed by the variety V<sub>1</sub>-N.S.404 (174.77 g) and V<sub>8</sub>-Cucumber Dash (166.66 g) as compared to rest of the varieties. While, the lowest 141.11 g noted in the variety V<sub>5</sub>- American Black. The variation in fruit weight might be due to the higher fruit diameter and length and also the vigour of the different varieties and then

adaptability to polyhouse condition. The findings of present investigation are in close conformity with the findings of few workers. (Olaniyi *et al.*, 2009; Hossain *et al.*, 2010; Patel *et al.*, 2013; Hakkim and Chand, 2014; Tekale *et al.*, 2014). Number of fruits per plant was recorded between the ranges 4.99-10.22. It is revealed that the number of fruits per plant of different varieties were significantly influenced under polyhouse condition. The variety V<sub>9</sub>-Green Star -11 was found significantly highest (10.22 fruit) While, the lowest 4.99 was noted in the variety V<sub>3</sub>-Beit Alpha. The variation in number of fruits per plant might be due to having more pistillate flowers and will set more fruits. These findings are in agreement with the results reported by few eminent workers. (Hamid *et al.*, 2002; Sharma *et al.*, 2010; Thappa *et al.*, 2011; Golabadi *et al.*, 2012; Patel *et al.*, 2013; Hakkim and Chand, 2014). Fruit yield per plant was recorded between ranges 1.01-1.64 kg. The variety V<sub>9</sub>-Green Star -11 found significantly superior (1.64 kg/plant) While, the lowest 1.01 kg fruit yield per plant was noted in the variety V<sub>3</sub>-Beit Alpha. The favourable microclimatic conditions maintained inside poly house helps to change the phase of plant from juvenile to reproductive phase and significantly contributed to higher fruit yield. (Tumbare *et al.*, 2004; Singh *et al.*, 2013; Ughade, 2016). Fruit yield per hectare was recorded between ranges 126.60 - 205.40 q/ha. Cucumber fruit yield (q/ha) was significantly affected due to various varieties. Significantly the highest fruit yield (205.40 q/ha) was recorded in the variety V<sub>9</sub>-Green Star while the minimum (126.60 q/ha) was recorded in the variety V<sub>3</sub>-Beit Alpha. The variation in fruit yield per plant might have been due to fruit set percentage, fruit length, number of fruits per plant, fruit weight, genetic nature, environmental factor and vigour of the crop. (Patel *et al.*, 2013). As the crop grown on raised beds under poly house condition which helps to maintain the proper proportion of air:soil:water and nutrient throughout the crop growth period. The microclimate in the poly house was more favourable to increase the growth and yield attributes of cucumber crop. The higher rate of photosynthate translocation from vegetative part (source) to reproductive organs (sink) might be increased the fruit size and weight which resulted in higher fruit yield of cucumber. (Kuscu *et al.*, 2014) Besides, genetic nature of the different varieties and uniform micro climate availability that influence on the availability of macro and micro nutrients resulting the higher yield and its attributing traits. (Tekale *et al.*, 2014) and

(Khan *et al.*, 2015). Total soluble solids of different varieties of cucumber are given in Table 3 revealed that the T.S.S. was recorded at ranges between 3.36-4.83%. The significantly maximum T.S.S. was recorded in the variety V<sub>9</sub>-Green Star -11 (4.83%) while minimum was recorded in the variety V<sub>5</sub>-American Black (3.36%). The higher T.S.S. value in Green Star-11 might be due to its inherent characteristics. (Choi *et al.*, 2012). Organoleptic test of different varieties based on taste, flavour and overall acceptability was recorded ranges between 4.10-8.30, 4.30-8.10 and 4.25-8.20, respectively. Among ten varieties, V<sub>9</sub>-Green Star -11 was found best for taste on the basis of sensory evaluation which secured highest score (8.30) on 9.0 hedonic scale. While, the minimum marks (4.10) was secured by the variety V<sub>10</sub>-Maharaja. In case of flavour, the variety V<sub>9</sub>-Green Star -11 obtained highest marks (8.10), While, minimum marks (4.30) was recorded in the variety V<sub>1</sub>-N.S.404. In case of overall acceptability, the variety V<sub>9</sub>-Green Star -11 achieved highest scores (8.20) whereas, minimum was obtained by the variety V<sub>1</sub>-N.S.404. It might be due to microbial spoilage more yellowing and shrivelling of cucumber. (Patel *et al.*, 2013).

## REFERENCES

- Ahmed, M., Hamid, A. and Akbae, Z. 2004. Growth and yield performance of six cucumber (*Cucumis sativus* L.) cultivars under Agroclimate condition Rawalkot. *Int. J. Agric. & Biol.* **6(2)**: 396-399.
- Barche, S. and Nair, R. 2014. Evaluation of chilli genotypes for vegetative and fruit characters under kymore plateau region of Madhya Pradesh. *The Ecoscan.* **6**: 121-125.
- Bailey, L. H. 1969. Manual of Cultivated Plants. Macmillan Company. New York. 1116.
- Choi, J. W., Park, M. H., Lee, J. H., Ran Do, K., Choi, H. J. and Kim, J. G. 2012. Changes of postharvest quality in 'Bagdadagi' cucumber (*Cucumis sativus* L.) by storage temperature. *J. Food and Nutrition Sci.* **3(1-2)**: 143-147.
- Hakkim, A. V. M. and chand, J. A. R. 2014. Effect of drip irrigation levels on yield of salad cucumber under naturally ventilated polyhouse. *IOSR J. Engineer.* **4(4)**: 18-21.
- Golabadi, M., Golkar, P. and Eghtedary, A. B. 2012. Assessment of genetic variation in cucumber (*Cucumis sativus* L.) genotypes. *European J. Experimental Biol.* **2(5)**: 1382-1388.
- Hamid, A. J., Balach, J. D. and Khan, N. 2002. Performance of six cucumber (*cucumis sativus* L.) genotype in Swat Pakistan. *Int. J. Agric. & Biol.* **4(4)**: 491-492.
- Haque, M. M., Hasanuzzaman, M. and Rahman, M. L. 2009. Morpho-Physiology and yield of cucumber (*Cucumis sativa*) under varying light intensity. *Academic J. Pl. Sci.* **2(3)**: 154-157
- Hossain, M. F., Rabbani, M. G., Hakim, M. A., Amanullah, A. S. M. and Ahsanullah, A. S. M. 2010. Study on variability character association and yield performance of cucumber (*Cucumis sativus* L.). *Bangladesh Res. Publications J.* **4(3)**: 297-311.
- Khan, Z., Shah, A. H., Gul, R., Majid, A., Khan, U. and Ahmad, H. 2015. Morpho-agronomic characterization of cucumber germplasm for yield and yield associated traits. *Int. J. Agro. and Agric. Res. (IJAAR).* **6(1)**: 1-6.
- Kuscu, H., Turhan, A., Ozmen, N., Aydinol, P. and Demir, A. O. 2014. Optimizing levels of water and nitrogen applied through drip for yield, quality and water productivity of processing tomato. *Hort. Env. and Biotech.* **55(2)**:103-114.
- Olaniyi, J. O., Ogunbiyi, E. M. and Alagbe, D. D. 2009. Effects of organo-mineral fertilizers on growth, yield and mineral nutrients uptake in cucumber. *J. Animal and Plant Sci.* **5(1)**: 437-442.
- Parvej, M. R., Khan M. A. H. and Awal, M. A. 2010. Phenological development and production potentials of tomato under polyhouse climate. *The J. Agric. Sci.* **5(1)**: 19-31.
- Patel, J. K., Bahadur, V., Singh, D., Prasad, V. M. and Rangare, S. B. 2013. Performance of cucumber (*Cucumis sativus* L) hybrids in agro-climatic conditions of Allahabad. *Hort. Flora. Res. Spectrum.* **2(1)**: 50-55.
- Sharma, M. D. and Bhattarai, S. P. 2006. Per for mance of cucumber cultivars at low hill during summer-rainy seasons. *J. Inst. Agric. Anim. Sci.* **27**: 169-171.
- Sharma, A., Kaushik, R. A., Sarolia, D. K. and Sharma, R. P. 2010. Response of cucumber plant geometry and method of fertilizer application on parthenocarpic cucumber under zero energy seasons. *Veg. Sci.* **37(2)**: 184-186.
- Singh, A., Gulati, J. and Chopra, R. 2013. Effect of various fertigation schedules and organic manures on tomato yield under arid condition. *The Bioscan.* **8(4)**:1261-1264.
- Singhania, D. L., Singh, D. and Raje, R. S. 2006. Coriander. In: Ravindran, P. R., K. N. Babu, K. N. Shiva. and J. A. Kallupurackal (eds.). *Advances in Spices and Achievements of Spices Research in India since Independence. Agrobios (India).* pp. 678-695.
- Thappa, M., Kumar, S. and Rafiq, R. 2011. Influence of plant growth regulators on morphological, floral and yield traits of cucumber (*Cucumis sativus* L.). *Kasetsart J. (Nat. Sci.)* **45(2)**: 177-188.
- Tumbare, A. D. and Nikam, D. R. 2004. Effect of planting methods and fertigation on growth and yield of green chilli (*Capsicum annum* L.). *Ind. J. Agric. Sci.* **74(5)**: 242-245.
- Tekale, C. D., Tumbare, A. D., Tekale, G. S., Danawale, N. J. and Tambe, S. T. 2014. Effect of different fertigation levels and schedules on growth and yield of cucumber under polyhouse condition. *Int. J. Current Res.* **6(7)**: 7353-7355.
- Ughade, S. R., Tumbare, A. D. and Surve, U. S. 2016. Fertigation scheduling to summer tomato (*solanum lycopersicum copersicum copersicum* l.) Under protected cultivation. *The Bioscan.* **11(1)**: 321-325.

