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## Off season performance of ten cucumber (*Cucumis sativus* L.) hybrids under naturally ventilated polyhouse

**Suman Nandi, Umesh Thapa, Satish Kr Subba, Reva Mondal and Pinkey Dukpa**

**Abstract**

The present investigation was conducted at Horticulture Research Station, Bidhan Chandra Krishi Viswa Vidyalaya, Mohanpur, Nadia, West Bengal with ten cucumber hybrid varieties namely Evergreen Plus, Susoma, Suvan, NS404, Kamini, Malini, Happy Dance, Monoroma, Nina Plus and Cucumber Dabang in a naturally ventilated arched saw teeth type polyhouse during the winter season (September-December) of 2016-2017. The experiment was laid out in Complete Randomized Design and replicated thrice. The aim of the experiment was to select the best performing hybrids on the basis of various growth parameters, yield attributes, yield and quality parameters of the plants. The results showed a highly significant difference ( $p < 0.05$ ) among the hybrids in all the traits. Maximum vine length (4.23 m), internodal length (15.20 cm) and number of leaves per vine (82.25) were found from the hybrid Malini. Whereas hybrid Happy Dance took minimum days for first female flowering (31.33), 50% flowering (42.81) and first harvesting (43.31). Simultaneously Happy Dance also showed a promising results in a nodal position where the first female flower (9.28) appeared. Harvesting period (52.26), number of fruits per vine (29.43), fruit yield per vine (5.65) and total fruit yield per  $m^2$  (20.13) were maximum from the hybrid Monoroma. So it can be concluded that hybrid Happy Dance and Monoroma can be suggested as the best hybrids for off season cultivation within a protected condition.

**Keywords:** Cucumber, polyhouse, off-season and yield

**1. Introduction**

Cucumber (*Cucumis sativus* L.) belonging to family Cucurbitaceae ( $2n=14$ ), is one of the important vegetable crops from nutritional as well as economic point of view. Protected cultivation of vegetables could be used to improve its yield quantity and quality (Singh *et al.*, 1999; Ganesan, 2004) [20, 6]. Production of cucumber in India is mainly restricted to its open field cultivation. Nevertheless, biotic and abiotic stresses are the main factors responsible for low yield and poor quality under open field cultivation. To overcome these problems in recent days for profitable cultivation adoption of protected cultivation for cucumber cultivation is gaining importance. Vegetable crops cultivated under protected condition are suitable for domestic and export purposes could be a more efficient alternative for land use and other resources (Sanwal *et al.*, 2004) [18]. Protected condition gives a chance to grow the vegetables during off season as well as it could solve the problem of lower productivity during extreme weather conditions. So, assessment of suitable variety and cultivation practice under protected condition takes beneficiary role for higher production.

**2. Materials and Methods**

The present investigation experiment was conducted in the naturally ventilated arched saw teeth type polyhouse, at Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, during September to December of 2016-2017. The experiment was laid out in Complete Randomized Design. The treatment factor includes ten hybrid cucumbers namely *viz.* Evergreen Plus, Susoma, Suvan, NS404, Kamini, Malini, Happy Dance, Monoroma, Nina Plus and Cucumber Dabang. The experiment was done in 30 plots and total number of plants allotted was 10 plants/plot. In the experiment, recommended of NPK (150: 90: 90) was applied in the field. For the conveniences of planting light irrigation, time to time pruning and training was adopted.

Mean value of the parameters in each replication was statistically analysed following Complete Randomized Design (C. R. D) and C. R. D (3 factor factorial) with Split-Split arrangement as suggested by Panse and Sukhatme (1985) [12] and Gomez & Gomez (1984) [8].

### 3. Results and Discussion

#### 3.1 Vegetative characters

The maximum vine length (4.23 m) and number of leaves (82.25) was recorded in Malini whereas minimum of (2.72 m) and (52.10) was found from NS-404 hybrid as presented in Table-1. The variation vine length and number of leaves

within the hybrids might be due to genetic inheritance of the individual hybrid as well as factors related to temperature and environmental factors for growth and development of the plant. Similar findings between the hybrids were also reported by Kumar *et al.*, (2008) [11] and Rawat *et al.*, (2014) [17].

A perusal of average data for internodal length of vine varied from 11.33 cm (Suvan) to 15.20 cm (Malini) presented in Table-1. In general the plants having less internodal length and more number of nodes are desired for getting higher yield. These results agree with findings of Rajasekar *et al.*, (2013) [15] and Ahmed *et al.*, (2004) [2]

**Table 1:** Performance of different cucumber hybrids on plant height, Internodal length and Number of leaves per plant

Hybrids	Vine length (m)	Inter-nodal length (cm)	Number of leaves/vine
Evergreen Plus	4.11	13.75	81.49
Susoma	3.02	12.00	68.99
Suvan	3.07	11.95	68.82
NS404	2.72	11.33	52.10
Kamini	2.78	11.67	59.06
Malini	4.23	15.20	82.25
Happy Dance	3.59	12.62	68.69
Monoroma	3.26	12.55	74.53
Nina Plus	2.99	11.86	58.19
Cucumber Dabang	2.81	11.79	52.55
CD(P=0.05)	0.307	1.616	5.253
S.Em(±)	0.103	0.544	1.768

#### 3.2 Reproductive characters

Significant differences were recorded in different hybrids of cucumber with respect to days required to first female flowering. The values of hybrids ranged between 31.33 to 45.02 days that may be due to genetic character within the different hybrids as reported by Kumar *et al.*, (2008) [11] and Yogesh *et al.*, (2009) [23].

The variation in nodal position of first female flower between the hybrids is expected due to their varietal characters. In hybrid Susoma female flower appeared at lower nodes (7.56) whereas, hybrid Nina Plus produced the first female flower at upper nodes (15.17) as presented in Table-2. Similarly Hybrid Happy Dance required 42.81 days to 50% flowering followed by Monoroma which required 44.91 days to 50% flowering as presented in Table-2. Solanki and Seth (1980) [21] and Solemani *et al.*, (2009) [22] reported that variation in 50%

flowering between the hybrids is expected due to their varietal characters.

In respect to mean fruit set percentage the values ranged between 67.66% and 92.54%. The regular slicing cucumber hybrids, Happy Dance and Monoroma were able to form flowers in order to convert them into fruits more efficiently than the other hybrids.

The cucumber hybrids, Happy Dance (43.31days) and Monoroma hybrid required (44.52days) for first fruit harvesting which was the shortest period from sowing to first fruit harvest. The traits *viz.* days to first female flower and days to first fruit picking, had high heritability with temperature and day length which were in conformity with the findings of Rastogi and Arya (1990) [16], Sharma and Bhattarai (2006) [19] and Patel *et al.*, (2013) [13]. The mean number of days taken for harvest duration ranged from 32.64 to 52.26 days as presented in Table-2.

**Table 2:** Performance of different cucumber hybrids on days required to first female flower, nodal position of first female flower, fruit set percentage; days required to 50% flowering, Days required first picking, Crop duration

Hybrids	Days required to first female flowering	Nodal position of first female flower	Days required to 50% flowering	Fruit setting percentage	Days required to first harvesting	Harvest duration
Evergreen Plus	42.92	11.58	56.00	90.61	51.60	39.70
Susoma	41.36	7.56	54.64	82.26	51.30	39.38
Suvan	36.87	12.88	50.20	82.86	45.87	44.97
NS404	39.51	9.28	53.32	86.55	51.55	35.25
Kamini	43.46	15.10	57.03	76.81	56.35	32.64
Malini	40.94	12.22	55.36	88.10	51.84	38.62
Happy Dance	31.33	9.28	42.81	92.54	43.31	52.17
Monoroma	32.12	9.62	44.91	91.93	44.52	52.26
Nina Plus	45.02	15.17	57.20	67.66	56.31	33.77
Cucumber Dabang	43.52	12.65	56.51	72.36	52.87	36.50
CD(P=0.05)	2.012	3.196	2.499	2.337	1.988	3.299
S.Em(±)	0.677	1.076	0.835	0.787	0.669	1.110

#### 3.3 Yield and yield attributing characters

The values of fruit length ranged from 14.75 cm to 20.30 cm. The highest fruit length of 20.30 cm was observed in Malini.

The maximum fruit diameter of 16.82 cm was observed in hybrid Suvan and the minimum of 14.02 cm was observed in NS404 as presented in Table-3. Fruit length and fruit width

were significantly higher under naturally ventilated polyhouse and insect proof net house compared to open field. The percentage change from maximum fruit diameter to minimum diameter was 19.97% which might be due to genetic characteristics of plant, different growing condition and environmental effects as reported by Kaddi *et al.*, (2014) [10], Afangideh and Uyoh (2007) [11].

Maximum average fruit weight was obtained in the hybrid Malini (216.31g) closely followed by Evergreen Plus (206.16g) whereas the minimum average fruit weight of 134.99 g was produced by Susoma as presented in Table-3. In general, the total fruit yield per vine is influenced mainly by mean fruit weight and number of fruits per vine which was similar to the findings of Jaffar and Wahid (2014) [9], Badgular and More (2004) [4] and Alsadon *et al.*, (2006) [3].

The number of fruits per vine plays a vital role in influencing the fruit yield as because the maximum number of fruits and fruit yield are directly correlated with number of fruits per vine. Among the cucumber hybrids, Monoroma registered

more number of fruits per vine (29.43) followed by Happy Dance (28.69) while less number of fruits per vine was observed in Cucumber Dabang (16.17) as presented in Table-3. Fruit yield is usually the most important index for selecting hybrids with high yield potential per plant or per unit area basis which determines commercial value. In relation to fruit yield per vine Monoroma and Happy Dance recorded highest fruit yield per vine (5.65 kg and 5.39 kg) and the hybrid Kamini recorded lowest fruit yield of 3.26 kg per vine. These results are inconformity with the findings of Bisht *et al.*, (2011), Afangideh and Uyoh (2007) [11] and Golabadi *et al.* (2012) [7]. The range of fruit yield kg per m<sup>2</sup> varied from 8.23 kg to 20.13 kg /m<sup>2</sup> in hybrids as presented in Table-3. The fruit yield was observed maximum in Monoroma (20.13 kg /m<sup>2</sup>) followed by Happy Dance (19.19 kg/m<sup>2</sup>). Whereas, minimum fruit yield of 8.23 kg /m<sup>2</sup> was recorded in Nina Plus. The variation in fruit yield was most probably due to a positives correlation between number of fruits per plant and yield.

**Table 3:** Performance of different cucumber hybrids on fruit length, fruit diameter, fruit weight, number of fruits/plant, fruit yield (kg)/plant, yield (kg)/m<sup>2</sup>

Hybrids	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)	Number of fruits/vine	Fruit yield (kg/vine)	Yield (kg/m <sup>2</sup> )
Evergreen Plus	18.87	15.68	206.16	21.80	4.32	15.37
Susoma	16.57	15.97	134.99	21.93	3.68	13.12
Suvan	14.75	16.82	178.43	18.56	3.45	12.31
NS404	17.49	14.02	185.32	17.23	3.52	12.55
Kamini	15.37	15.39	146.92	20.00	2.33	8.33
Malini	20.30	15.48	216.31	22.99	4.47	15.83
Happy Dance	15.61	15.32	198.63	28.69	5.39	19.19
Monoroma	17.72	16.28	201.19	29.43	5.65	20.13
Nina Plus	17.76	16.74	169.9	16.95	2.30	8.23
Cucumber Dabang	17.12	15.96	186.26	16.17	2.71	9.66
CD(P=0.05)	1.146	0.867	10.338	2.191	0.452	1.609
S.Em(±)	0.386	0.292	3.480	0.737	0.152	0.542

### 3.4 Quality attributing characters

As fruit with high TSS is one of the important quality attributes of cucumber fruit thus the increase in this parameter improves the flavour making it suitable for salad making. High TSS of 3.54°Brix was recorded in the hybrid Nina Plus followed by Suvan (3.43° Brix), whereas the lowest TSS was recorded in Evergreen Plus (2.21° Brix) as presented in Table-4. Enhanced deposition of solids may be probable

reason for higher TSS values as reported by Patel *et al.*, (2013) [13] in cucumber.

Highest moisture percentage was recorded in the hybrid Malini (93.75%) followed by Evergreen plus (93.72%). Similarly the lowest moisture percentage was recorded in Nina Plus (90.75%). Moisture content is also an inexpensive ingredient that influences the taste, texture, weight, appearance, and shelf life of food stuffs.

**Table 4:** Performance of different cucumber hybrids on TSS and moisture percentage

Hybrids	TSS	Moisture percentage (%)
Evergreen Plus	2.21	93.72
Susoma	2.68	91.62
Suvan	3.43	91.60
NS404	3.16	91.50
Kamini	2.48	91.20
Malini	2.50	93.75
Happy Dance	2.35	92.83
Monoroma	2.47	91.78
Nina Plus	3.54	90.75
Cucumber Dabang	2.30	91.88
CD(P=0.05)	0.225	1.445
S.Em(±)	0.076	0.486

### 4. Conclusion

Based on result obtained from the present investigation, it may be concluded that out of ten hybrids of cucumber, two hybrids *viz.* Happy Dance and Monoroma performed best on the basis of growth, yield and quality parameters. Cucumber hybrid Monoroma produced significantly higher fruit yield as

compared to hybrid Happy Dance. From the over all of the present investigation it may be suggested and concluded that for successful investigation of cucumber under protected condition hybrid Monoroma is an ideal hybrid for off season.

## 5. References

- Afangideh U, Uyoh EA. Genetic variability and correlation studies in some varieties of cucumber (*Cucumis sativus* L.). *Jord. J Agril. Sci.* 2007; 3(4):376-382.
- Ahmed M, Hamid A, Akbar Z. Growth and yield performance of six cucumber (*Cucumis sativus* L.) cultivars under agro-climatic conditions of Rawalakot, Jammu and Kashmir. *Int. J Agr. Biol.* 2004; 6(2):396-399.
- Alsadon A, Al Helal I, Ibrahim A, Abdel.Ghany A, Al Zaharani S, Ashour T. The effects of plastic greenhouse covering on cucumber (*Cucumis sativus* L.) growth. *Ecol. Eng.* 2016; 87:305-312.
- Badgular CD, More TA. Off season performance of selected tropical gynoceious cucumber hybrids grown under different regimes. *South. Ind. Horti. J* 2004; 52(1/6):97-103.
- Bisht Bhawana MP, Singh BK, Srivastava YV, Singh PK. Evaluation of open-pollinated varieties and hybrids of cucumber for off-season production under naturally ventilated polyhouse. *Indian J Horti.* 2010; 67(2):202-205.
- Ganesan M. Effect of poly-greenhouse on plant microclimate and fruit yield of tomato. *IE (I).J.-AG* 80:12-16. Hawthron LR, Pollard H (1957). *Vegetable and flower seed production*, Biakisten Company, New York, 2004.
- Golabadi MM, Golkar P, Eghtedary AR. Assessment of genetic variation in cucumber (*Cucumis sativus* L.) genotypes. *Euro. J Exp. Bio.* 2012; 2(5):1382-1388.
- Gomez Kwanchai A, Kwanchai A Gomez, Arturo A Gomez. *Statistical procedures for agricultural research.* John Wiley & Sons, 1984.
- Jaffar A, Wahid F. Effect of row spacing on growth, yield and yield components of cucumber varieties. *Sci Lett.* 2014; 2:33-38.
- Kaddi G, Tomar BS, Singh B, Kumar S. Effect of growing conditions on seed yield and quality of cucumber (*Cucumis sativus*) hybrid. *Ind. J Agril. Sc.* 2014; 84:624-627.
- Kumar A, Kumar S, Pal AK. Genetic variability and characters association for fruit yield and yield traits in cucumber. *Indian J Horti.* 2008; 65(4):423-428.
- Panse VG, PV Sukhatme. *Statistical methods for agricultural research.* ICAR, New Delhi, 1985.
- Patel JK, Bahudur V, Singh D, Prasad VM, Rangare SB. Performance of cucumber (*Cucumis sativus* L.) hybrids in Agro- climatic conditions of Allahabad. *Hort. Flora Res. Spectrum.* 2013; 2(1):50-55.
- Patel JK, Bahudur V, Singh D, Prasad VM, Rangare SB. Performance of cucumber (*Cucumis sativus* L.) hybrids in Agro- climatic conditions of Allahabad. *Hort. Flora Res. Spectrum.* 2013; 2(1):50-55.
- Rajasekar M, Arumugam T, Kumar SR. Influence of weather and growing environment on vegetable growth and yield. *J Horti. For.* 2013; 5(10):160-167.
- Rastogi KB, Arya D. Variability studies in cucumber (*Cucumis sativus* L.). *J Veg. Sci.* 1990; 17(2):224-226.
- Rawat M, Maurya SK, Singh PK, Maurya RJ. Screening of improved cultivars of cucumber in naturally ventilated polyhouse under tarai condition of Utrakhand. *J Hill Agric.* 2014; 5(1):72-75.
- Sanwal SK, Patel KK, Yadav DS. Vegetable production under protected conditions in NEH region: Problems and prospects. *Indian Soc. Veg. Sci.* 2004; 3:120-129
- Sharma MD, Bhattarai SP. Performance of cucumber cultivars at low hill during summer-rainy seasons. *J Inst. Agric. Animal Sci.* 2006; 27:169-171.
- Singh Narender, Diwari SK Paljor. Ladakh Mein Sabjion Kei Sanrakshi Kheti. *Regional Research Laboratory of DRDO, Leh. Pub. D.R.D.O., Leh. Pub. D.R.D.O. A.P.O.* 1999, 56.
- Solanki SS, Seth JN. Studies on genetic variability in cucumber (*Cucumis sativus* L.). *Progressive Horticulture.* 1980; 12(1):43-49.
- Soleimani A, Ahmadikhah A. Performance of different greenhouse cucumber cultivars (*Cucumis sativus* L.) in southern Iran. *Afr. J Biotechnol.* 2009; 8(17):4077-4083.
- Yogesh C, Yadav Kumar S, Bisen B, Dixit SK. Genetic variability, heritability and genetic advance for some traits in cucumber. *Indian J Horti.* 2009; 66(4):488-491.