Original Research Article

THE GROWTH CHARACTERISTIC OF CUCUMBER (*Cucumis sativus* L.) GENOTYPES AND VARIETIES GROWN UNDER PRAYAGRAJ AGRO-CLIMATIC CONDITIONS

ABSTRACT

An experiment was conductedat Horticulture Research Field, Department of Horticulture, during the year 2022. This experiment was conducted to find out the best performing genotypes in terms of growth, yield and quality of cucumber.Seven cucumber genotypes such as IET,2021/CUCUVAR-1,2,3,4,5,6,7 and three check variety namely NAZIA,LHC-1395 and MALINI were evaluated at SHUATS, Prayagraj in randomized block design with three replications in 4.5 x 3.0 m plot during summer season 2022 to find out the best performing genotype in related to growth, yield and fruit quality traits. NAZIA was found with the maximum fruit weight (247.67g), Fruit length (18.37cm), Fruit yield per plot (43.64 kg), Fruit yield (326.40 q/ha). NAZIA was found superior based on overall performance in term of growth, yield and quality and highest net return (3,33,718 Rs/ha). The highest cost benefit ratio (3.14) was found for cucumber in NAZIA variety under prayagraj agro-climatic condition.

KEY WORD :- Cucumber,Performance,Genotypes

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the most popular vegetable belong to the family Cucurbitaceae, with a chromosome number 2n=14. Botanically all cucurbits are „Pepo" and belongs to family cucurbitaceae. Cucurbits are the largest group of summer season vegetables and extensively grown in tropical, subtropical and milder zones of India. Cucurbits have been important to man as a source of food and utensils since the down civilization. Cucumber (*Cucumis sativus* L.) is a widely cultivated plant in the gourd family Cucurbitaceous. It is a creeping vine that bears cylindrical fruits that are used as culinary vegetables. The cucumber is originally from Southern Asia, but now grows on most continents. Many different varieties are traded on the global market Rajawat *et al.*, (2017)[1].

The family cucurbitaceae is moderately large one, comprising about 117 genera and 825 species (Jeffery, 1983)[2]. It includes large number of vegetables such as cucumber, pumpkins, gourds and melons.

Cucumber (*Cucumis sativus* L.) is one of the oldest amongst the cultivated vegetablecrops and has been found in cultivation since 3000 to 4000 years.

It is an ideal summer vegetable crop chiefly grown in India as well as in the world for its edible tender fruits, preferred as salad ingredient, pickles, desert fruit and as a cooked vegetable. Cucumber has got cooling effect, so in the eastern countries, fruits are often used as cooling vegetable. Cucumber is considered as fourth most important vegetable crop after tomato, cabbage and onion.

Cucumber is considered as fourth most important vegetable crop after tomato, cabbage and onion. Cucumber is used for different purpose like as salad, table purpose and pickling but mostly used as salad purpose. Prevents constipation and checks jaundice and indigestion. It contains (96.3g) water, (0.4g) protein, (0.1g) fat, (0.3g) minerals, (0.4g) fibre, (2.5g) carbohydrate, (13Kcal) energy, (10mg) calcium, (25mg) phosphorus, (1.5mg)iron, (0.33mg) thiamine, (0.2mg) niacin, (7mg) vitamin „C" per (100g) edible portion (Gopalan et al., 1982)[3]. Cucumber is a commonly used salad vegetable and a source of a variety of conventional nutrients and antioxidants. It is widely used for various skin problems including swelling under the eyes and sunburn, as it promotes refreshing, cooling, healing, soothing, and anti-itching effect to irritated skin Chuyaku (1985)[4]. Severalpharmacological activities including the antioxidant, antiwrinkle, antimicrobial,antidiabetic, and hypolipidemic potentials have been reported with this plant. One of the

antioxidants found in cucumber has been identified as an essential component in organism"s defense mechanism against oxidative stress Lee *et al.*, (2003)[5].

MATERIALS AND METHODS

The present investigation was carried out during the summer season year 2022 at Horticulture Research Farm, Department of horticulture, Naini Agriculture Institute, Sam Higginbottom Institute of Agriculture Technology and Sciences, Prayagraj (U.P).In this experiment seedlings are grown under ploy house conditions with help of protraysand cocopeat with vermicompost used for seed germination. The experiment was laid out in randomized block design with three replications on 26th February 2022. The transplanting was done on ridges with spacing of 50 cm and 150 cm plant to plant and row to row respectively, each plot with 16 plants. Adopting the recommended cultivation practices for raising a healthy crop. Data's were recorded on all the important characters pertaining to the present study.The cultural practices such as irrigation weeding and plant protection measure were carried out uniformly as and when required.

Table.1 – List of Cucumber Genotypes.

Notation	Name of Genotypes	Sources
G1	IET,2021/CUCUVAR-1	IIVR,Varanasi
G2	IET,2021/CUCUVAR-2	IIVR,Varanasi
G3	IET,2021/CUCUVAR-3	IIVR,Varanasi
G4	IET,2021/CUCUVAR-4	IIVR,Varanasi
G5	IET,2021/CUCUVAR-5	IIVR,Varanasi
G6	IET,2021/CUCUVAR-6	IIVR,Varanasi
G7	IET,2021/CUCUVAR-7	IIVR,Varanasi
C1	NAZIA (Check variety)	East-West Seed Private Limited
C2	LHC-1395 (Check variety)	Laxmi Inputs Private limited
C3	MALINI (Check variety)	Seminis Private limited

RESULTS AND DISCUSSION

(A) Growth parameters

1. Length of vine (cm) in various genotypes of cucumber

Significant differences in the length of vines were recorded in the various genotypes. Maximum vine length has been observed in IET,2021/CUCUVAR-03 (201.27 cm) followed by IET,2021/CUCUVAR-01 (191.27cm). The minimum vine length was observed in IET,2021/CUCUVAR-6 (72.87cm).The variation in vine length might have been due to specific genetic makeup of different Genotypes, inherent properties, environmental factor, hormonal factor and vigour of the crop.The variation in vine length in has also been reported by **Chandra *et al.*, (2012).**Similar findings between the hybrids were also reported by **Kumar *et al.*, (2008)** and **Rawat *et al.*, (2014).**

2. Number of Primary branches per vine in various genotypes of cucumber

Observation shows significant differences among the various genotypes in the number of Primary branches per vine. Maximum was observed in genotypes IET,2021/CUCUVAR-3 (7.07) and followed by NAZIA(6.27). The smallest number of branches per vine was observed in genotype IET,2021/CUCUVAR-6 (2.87). The variation in number of primary branches per plant might have been due to its own genetic makeup and also due to vine length, internodal length, hormonal factor and environmental factor also. The variation has been reported by **Bairagi *et al,*.(2005) and Chandra *et al.*, (2012).**

(B) Floral Parameters

1. Days to first appearance of male flower in various genotypes of cucumber

The various genotypes showed non-significant difference in the first appearance of male flowers. Minimum days were recorded for first appearance of male flower was observed in MALINI (45 days) and followed byIET,2021/CUCUVAR-3 (46.53 days). The maximum number of days for first appearance of male flower was observed in IET,2021/CUCUVAR-5 (46.67 days).The variation in first appearance of male flower, might have been due to number of internodes, genetic factor, environmental factor, hormonal factor and vigour of the crop.Similar findings were reported by **Badgujar and More (2004) and Sharma and Bhattarai (2006).**

2. Days to first appearance of female flower in various genotypes of cucumber

According to the data, there was a non-significant difference in the first appearances of female flowers among the various genotypes of cucumber. Minimum days were recorded for first appearance of female flower was observed in cucumber MALINI (45 days) and followed by the genotype IET,2021/CUCUVAR-3 (47.20 days). Maximum number of days for first appearance of female flower was observed in genotype IET,2021/CUCUVAR-5 (47.72 days). The variation in first appearance of female flower might have been due to first appearance of male flower, inter nodal length, number of internodes, genetic factor, environmental factor, hormonal factor and vigour of crop. Similar findings were reported by **Badgujar and More (2004) and Sharma and Bhattarai (2006).**

3. Node at which the first male flower appears in various genotypes of cucumber

There was a significant difference between the genotypes in the node at which the first male flower appears. Appearance of first male at a particular node is also important for high yields. Minimum node at which the first male flower appears was recorded in IET,2021/CUCUVAR-2 (2.33), followed by NAZIA (3.93). Maximum node number at which first male flower appears was found in IET,2021/CUCUVAR-3 (4.80). The variation in node number at which first male flower appears might have been due to specific genetic makeup of different Genotypes prevailing environment condition. Similar findings were reported by **Bairagi *et al.*, (2005) and Sharma and Bhattarai (2006) and Patel *et al.*, (2013).**

4. Node number at which the first female flower appears in various genotypes of cucumber

There was a significant difference in the in the node number at which the first female flower appears among the various genotypes. Appearance of first female at a particular node is also important for high yielding cultivars. Minimum node at which the first male flower appears was recorded in IET,2021/CUCUVAR-4 (2.87) and followed by MALINI (5.13). Maximum node number at which first female flower appears was found in LHC-1395 (6.27).The variation in node number at which first female flower appears might have been due to specific genetic makeup of different Genotypes and prevailing environmental condition. Similar findings were reported by **Bairagi *etal.*, (2005) and Sharma and Bhattarai (2006) and Patel *et al.*, (2013).**

5. Number of male flowers per vine in various genotypes of cucumber

The data showed significant differences in the number of male flowers between variousgenotypes of cucumber. Maximum number of male flowers per vine was observed in NAZIA (54.60) followed by LHC-1395 (53.40). The minimum number of male flowers per vine was observed in IET,2021/CUCUVAR-7 (38.80).The variation in number of male flowers might have been due to their genetic nature. environmental factor, hormonal factor and vigour of crop.Similar results have been shown in **Patel *et al.*, (2013).**

6. Number of female flowers per vine in various genotypes of cucumber

According to the data shown, there was a significant difference among the number of female flowers per vine. Maximum number of female flowers per vine was observed in MALINI (13.87), followed by NAZIA (13.60). The minimum number of male flowers per vine was observed in genotype IET,2021/CUCUVAR-7 (9.53).The number of female flowers is an important character for earliness or lateness of crop in general. The variation in number of female flowers per vine might have been due to their genetic nature, hormonal factor, environmental factor and vigour of crop. Similar results have been shown in **Patel *et al.*, (2013).**

7. Days to first fruit Picking invariousgenotypesof cucumber

According to the data, there was a significant difference in the days to first fruit picking among the various genotypes. The genotype IET,2021/CUCUVAR-6 (34.20 days) has taken minimum to first fruit picking followed by genotypeIET,2021/CUCUVAR-2 (43.33days). Genotype IET,2021/CUCUVAR-7 (44.93 days) has

taken the maximum time to first fruit picking.The variation in days to first fruit picking might have been due to genetic factor, environmental factor, hormonal factor and vigour of crop.Similar results have been reported **by Chandra *et al.*, (2012) and Kumar *et al.*,(2013).**

8. Days to first fruit setting in various genotypes of cucumber

There was a non-significant difference between the genotypes in days to first fruit setting. The cucumber MALINI (16.67 days) has taken minimum days to first fruit setting followed by IET,2021/CUCUVAR-3 (19.20 days). IET,2021/CUCUVAR-5 (19.87 days) has taken the maximum days to first fruit setting.The variation in days to first fruit setting might have been due to genetic factor, environmental factor, hormonal factor and vigour of crop. Similar results have been reported by **Prasad (1985), Paner (1995)** and **Howalder *et al.* (1999).**

9. Number of Pickings in variousgenotypes of cucumber

According to the data, there was a significant difference between the genotypes in number of pickings. The maximum number of pickings recorded in IET,2021/CUCUVAR-1 (4.33), followed by NAZIA and MALINI (4.07). IET,2021/CUCUVAR-7 (2.20) was observed minimum number of pickings. The variation in number of pickings per plant might have been due to sex ratio, fruit set percentage, genetic nature and their response to varying environmental conditions. Similar findings between the hybrids were also reported by **Kumar *et al.*, (2008) and Rawat *et al.*, (2014).**

10. Sex ratio of various genotypes of cucumber

There was a significant difference between the genotypes in sex ratio. The maximum sex ratio was observed in LHC-1395 (4.21), followed by NAZIA (3.81) and minimum sex ratio was recorded in IET,2021/CUCUVAR-4 (3.16). The variation in fruits per plant might have been due to number of male flower, number of female flower, genetic nature and their response to varying environmental conditions. Similar findings between the hybrids were also reported by **Kumar *et al.*, (2008)** and **Rawat *et al.*, (2014).**

(c) Yield Parameters

1. Number of fruits per vine in various genotypes of cucumber

The data shows significant differences in the number of fruits per vine of various genotypes. It has been observed that the cucumber MALINI (11.33) gives the maximum number of fruits followed by IET,2021/CUCUVAR-1 (11.27). The lowest number of fruits was observed in IET,2021/CUCUVAR-7 (6.13).The variation in fruits per plant might have been due to sex ratio, fruit set percentage, genetic nature and their response to varying environmental conditions. This type of similar results have also been reported **in Chandra *et al.*, (2012) and Patel *et al.***

2.Fruit diameter (cm) invariousgenotypes of cucumber

According to the data, the various types of genotypes show significant difference in the diameter of fruits. Maximum fruit diameter was found in LHC-1395 (4.67 cm) followed by NAZIA (4.50 cm). Minimum fruit diameter was observed in IET,2021/CUCUVAR-6 (2.63 cm).The variation in fruit diameter, might have been due to genetic factor, environmental factor, hormonal factor and vigour of the crop. Similar results were reported by **Badgujat and More (2004) and Rakhi and Rajamony (2005).**

3.Fruit length (cm) in various genotypes of cucumber.

The observations according to the data have shown significant difference in the fruit length of various genotypes of cucumber. Maximum fruit length was observed in the cucumber NAZIA (18.37 cm), followed by IET,2021/CUCUVAR-7 (16.03) and Minimum fruit length was observed in the genotype IET,2021/CUCUVAR-6 (9.70 cm).The variation in fruit length, might have been due to genetic nature, environmental hormonal factor and vigour of crop. Similar results were reported by **Badgujat and More (2004) and Rakhi and Rajamony (2005).**

4. Fruit weight (g) in various genotypes of cucumber.

According to the data presented below (table.
4), significant difference in fruit weight was recorded. The highest fruit weight was recorded in the cucumber NAZIA (247.67 g) and followed by LHC-1395 (181.33 g). The lowest fruit weight was recorded with IET,2021/CUCUVAR-6 (46.67 g). The highest fruit weight in NAZIA Super may be due to its vigour and adoptability to Allahabad agro-climatic conditions.Similar results were reported by **Kumar *et al.*, (2013).**

5. Fruit yield per plot (kg) in various genotypes of cucumber

According to the data, there was a significant difference among the genotypes with regard to yield per plot. The maximum fruit yield per plot was found in the cucumber NAZIA (43.64 kg) followed by cucumber LHC-1395 (29.92 kg). The lowest fruit yield per plot was recorded in IET,2021/CUCUVAR-7 (6.67 kg).The significant

variation in yield per plot might have been due to fruit set percentage, fruit length, or of fruit per vine, fruit weight and fruit width, genetic nature, environmental factor and vigour of the findings were supported by **Srivasvata and Srivastava(1976), Singh *et al.*, (1996) and Hawlader (1991).**

6. Fruit Yield (q/ha) in various genotypes of cucumber

According to the data, there was significant difference recorded amongst the genotypes with regard to yield (q/ha). The maximum fruit yield (q/ha) was recorded in NAZIA (326.40 q/ha), followed by LHC-1395 (209.60 q/ha). Lowest yield was recorded in the genotype IET,2021/CUCUVAR-7 (49.60 q/ha).The significant variation in fruit yield might have been due to number of fruits per plant, yield per plant and yield per plot. This investigation was also supported by **Sharma and Bhattarai (2006) and Patel *et al.*, (2013).**

(D) Quality Parameters

1. Total Soluble Solids (°Brix) andVitamin 'C' mg/100g in various genotypes of cucumber.

The data observed showed that there are significantdifference among the different genotypes of cucumber. The maximum TSS value was found in IET,2021/CUCUVAR-1 (2.60), followed by NAZIA (2.43) and LHC-1395 (2.43). Minimum value was found in IET,2021/CUCUVAR-7 (2.0).

The significant variation in fruit yield might have been due to number of fruits per plant, yield per plant and yield per plot. Variation results werereported by **Patel *et al.*, (2013) and Kumar *et al.*, (2013).**

According to the data, it showed that there was significant difference among the genotypes of cucumber. The maximum vitamin 'C' mg/100g recorded in IET,2021/CUCUVAR-1 (1.77) and followed by NAZIA (1.63), MALINI (1.63) and The lowest vitamin 'C' mg/100g was found in IET,2021/CUCUVAR-2 (1.37).**.** Generally, high ascorbic acid content would increase the nutritive value of cucumbers, which would help better retention of colour and flavor. The variation of Vitamin 'C' mg/100g cucumber genotypes have also been reported by **Patel *et al.*, (2013).**

3. Hedonic rating for Organoleptic properties in various genotypes of cucumber.

According to the data, it showed that there was significant difference among the genotypes of cucumber. The maximum hedonic rating observed in IET,2021/CUCUVAR-1 (8.0) and followed by IET,2021/CUCUVAR-2, IET,2021/CUCUVAR-3 (7.0) and IET,2021/CUCUVAR-7 (7.0) and The lowest ratingwas found in LHC-1395 (5.0). The genotype IET,2021/CUCUVAR-1 (8.0) obtained highest hedonic rating on the basis of color, taste and flavor of cucumber fruits of various genotypes. Similar estimates for this character were recorded in different genotypes in cucumber **(Kumar *et al.* 2016).**

(E) Economic Analysisin various genotypes of cucumber

Maximum gross return was obtained in the cucumberNAZIA (Rs.4,89,000/ha) followed by cucumber LHC-1395 (Rs.3,14,400/ha) and the minimum was obtained in IET,2021/CUCUVAR-7 (Rs.74,400/ha). Maximum net return was obtained in the cucumberNAZIA(Rs.3,33,718/ha) followed by cucumber LHC-1395 (Rs.16,0518/ha) and the minimum was obtained inIET,2021/CUCUVAR-7 (Rs.74,482/ha). Maximum Benefit: Cost Ratio was obtained in the cucumber NAZIA (3.14) followed by cucumber LHC-1395 (2.04) and the minimum was obtained in genotypeIET,2021/CUCUVAR-7 (0.49).

Conclusion

The Results from the research it can be concluded that cucumber NAZIA was found superior than other genotypes in terms of growth, yield and quality characters**.. NAZIA was found with the maximum fruit weight (247.67g), Fruit length (18.37cm), Fruit yield per plot (43.64 kg), Fruit yield (326.40 q/ha). In the economics analysis of the genotypes, NAZIA again turn out to be highest in terms of the gross return (Rs.4,89,600/ha) and net return (Rs.3,33,718/ha). The highest benefit cost ratio was also seen in the genotype NAZIA (3.14) under Prayagraj agro-climate condition.**

Therefore, from the results of research, the cucumber NAZIA was found superior from various other genotypes used in the research and therefore it can be recommended for the cultivation in prayagraj agro-climatic condition for growth, quality and yield of cucumber.

Table. 2 – Cost Benefit Ratio of various genotypes of cucumber

Notation	Genotypes	Fruit Yield (q/ha)	Gross Return (Rs/ha)	Cost of Cultivation (Rs/ha)	Net Return (Rs/ha)	B:C Ratio
G1	IET,2021/CUCUVAR-1	169.60	2,54,400	1,48,882	105518	1.70
G2	IET,2021/CUCUVAR-2	126.80	1,90,200	1,48,882	41318	1.27
G3	IET,2021/CUCUVAR-3	130.40	1,95,600	1,48,882	46718	1.31
G4	IET,2021/CUCUVAR-4	119.60	1,79,400	1,48,882	30518	1.20
G5	IET,2021/CUCUVAR-5	194.40	2,91,600	1,49,882	141718	1.94
G6	IET,2021/CUCUVAR-6	52.40	78,600	1,48,882	70282	0.52
G7	IET,2021/CUCUVAR-7	49.60	74,400	1,48,882	74482	0.49
C1	NAZIA (Check variety)	326.40	4,89,600	1,55,882	333718	3.14
C2	LHC-1395 (Check variety)	209.60	3,14,400	1,53,882	160518	2.04
C3	MALINI (Check variety)	109.60	1,64,400	1,52,882	11518	1.07

Notation	Genotypes	Vine length (cm)	No. of primary branches /plant	Days to 1st emergence Male flower	Days to 1st emergence Female flower	Node number at which 1st Male flower	Node number at which 1st Female flower	Number of Male flower	Number of Female flower	Sex Ratio	Days to 1st fruit setting	Days to 1st fruit picking	No. of picking
G1	IET,2021/CUCUVAR-1	191.27	5.80	45.73	46.13	3.47	4.53	50.27	13.13	3.76	17.80	37.47	4.33
G2	IET,2021/CUCUVAR-2	148.53	4.67	45.60	47.07	2.33	4.00	45.20	12.00	3.49	18.73	43.33	2.73
G3	IET,2021/CUCUVAR-3	201.27	7.07	46.53	47.20	4.80	4.93	43.13	11.07	3.50	19.20	39.67	3.93
G4	IET,2021/CUCUVAR-4	137.53	3.93	45.87	46.67	3.13	2.87	40.80	12.20	3.16	18.60	39.67	3.27
G5	IET,2021/CUCUVAR-5	179.27	3.53	46.67	47.72	3.87	4.22	47.20	12.13	3.80	19.87	43.20	3.20
G6	IET,2021/CUCUVAR-6	72.87	2.87	45.87	46.60	2.93	4.40	41.13	11.80	3.44	18.60	34.20	3.33
G7	IET,2021/CUCUVAR-7	152.80	3.93	45.93	45.93	3.27	4.27	38.80	9.53	3.69	18.20	44.93	2.20
C1	NAZIA (Check variety)	128.20	6.27	46.13	46.27	3.93	3.67	54.60	13.60	3.81	17.80	34.93	4.07
C2	LHC-1395 (Check variety)	174.00	4.20	45.20	45.60	2.93	6.27	53.40	12.80	4.21	17.53	37.27	3.87
C3	MALINI (Check variety)	152.27	5.33	45.00	45.00	2.47	5.13	51.13	13.87	3.70	16.67	35.73	4.07
	F-Test	S	S	NS	NS	S	S	S	S	S	NS	S	S
	S. Ed. (±)	9.30	0.33	0.50	0.85	0.44	0.80	1.49	1.38	0.11	0.86	2.95	0.49
	CD at @5%	19.53	0.69	1.06	1.79	0.93	1.68	3.14	2.89	0.23	1.82	6.20	1.03
	CV	7.40	8.42	1.34	2.24	16.39	22.11	3.93	13.80	3.71	5.79	9.25	17.19

Table.3- Mean Performance of Cucumber Genotypes and varieties on Growth and Floral parameter

Table.4–Mean Performance of Cucumber Genotypes and varieties on Yield and Quality parameter

Notation	Genotypes	No. of fruits/ plant	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Fruit yield/ Plot (kg)	Yield (q/ha)	TSS (^{o}Brix)	Vitamin e C (mg/100 g)	Organoleptic property
G1	IET,2021/CUCUVAR-1	11.27	124.00	13.23	3.53	22.71	169.60	2.60	1.77	8.00
G2	IET,2021/CUCUVAR-2	9.93	106.67	12.37	3.27	17.00	126.80	2.10	1.37	7.00
G3	IET,2021/CUCUVAR-3	8.53	125.00	14.23	3.73	17.47	130.40	2.10	1.47	7.00
G4	IET,2021/CUCUVAR-4	10.20	98.33	12.13	3.30	15.99	119.60	2.40	1.57	6.00
G5	IET,2021/CUCUVAR-5	9.60	170.33	15.53	4.43	26.57	194.40	2.33	1.60	6.00
G6	IET,2021/CUCUVAR-6	9.40	46.67	9.70	2.63	7.06	52.40	2.33	1.40	6.83
G7	IET,2021/CUCUVAR-7	6.13	66.33	16.03	2.70	6.67	49.60	2.00	1.43	7.00
C1	NAZIA (Check variety)	11.00	247.67	18.37	4.50	43.64	326.40	2.43	1.63	6.00
C2	LHC-1395 (Check variety)	10.33	181.33	15.13	4.67	29.92	209.60	2.43	1.60	5.00
C3	MALINI (Check variety)	11.33	83.67	13.50	3.33	15.05	109.60	2.40	1.63	5.33
	F-Test	S	S	S	S	S	S	S	S	S
	S. Ed. (±)	1.21	1.90	0.25	0.14	2.12	18.41	0.12	0.09	0.16
	CD at @5%	2.55	4.00	0.53	0.29	4.46	38.67	0.25	0.19	0.34
	CV	15.22	1.87	2.19	4.75	12.87	15.15	6.33	7.12	3.11

References

Ahmed, Maqsood; Hamid, Abdul and Zarqa, Akbar (2004). Growth and Yield Performance of Six Cucumber (Cucumis sativus L.). Cultivars Under Agro- Climatic Conditions of Rawalakot, Azad Jammu and Kashmir. International J. Agri. & Bio. 1560–8530/06–2–396–399.

Aviles-Rodriguez, L.N.; Caraballo, E. and Fornaris-Rullan, G. (1990). An evaluation of 10 cucumber (Cucumis sativa L.) cultivars in southern PuertoRico. J. Agri. the Univ. of Puerto Rico. 74(4):461-463.

Bairagi, S.K., Ram, H.H., Singh D.K. and Maurya, S.K. 2005. Exploitation of hybrid vigor for yield and attributing traits in cucumber. Ind. J. Hort. 62 (1):41-45.

Badgujar CD, More TA. (2004). Off season performance of selected tropical gynocecious cucumber hybrids grown under different regimes. South. Ind. Horti. J 2004; 52(1/6):97-103.
Chen Xuehao; Cao Peishing and Xu Quiang (1994). Genetic Correlation and path coefficient analysis of yield components, in cucumber in Beijing, China Adv. Hort., pp 249-251.

Chuyaku DD. (1985). Shanghai Technology. Shogakukan Press; Tokyo; 1985.

Grimstad, S.O.(1990). Evaluation trials of greenhouse cucumbers. [Norwegian] Gartneryrket. 80 (21): 16-18.

Gopalan, C., Shastri, B. V. R. and Balasubramaniam, S. C. (1982). Nutritive value of Indian food, Indian Council of Medical Res., Hyderabad, National Institute of Nutrition, 18: 251-253.

Jackson, M.L. (1967). Soil Chemical Analysis Prentice Hall Inc. Englewood cliffs, New Jersy, 49.

Jeffery, C. (1983). Proc. Conference on the Biology and Chemistry of Cucurbitaceae, Cornell University, Ithaca, New York, August, pp. 141- 145.

Joshi, S., Joshi, M.C., Singh, B. and Vishoni, A. K. (1981). Genotypic and phenotypic variability in cucumber (Cucumis sativus L.). Veg. Sci. 8 (20): 114-119.

Kalloo, G., Dixit, J. and Sithu, A.S. (1983). Studies on genetic variability characters association in muskmelon (Cucumis melo L.) Ind. J. Hort. 40 (1 & 21): 79-85

Lee HS, Kwon EJ, Kwon SY, Jeong YJ, Lee EM, Jo MH, Kwak SS. (2003) Transgenic cucumber fruits that produce elevated level of an anti-aging superoxide dismutase. Molecular Breeding; 11(3):213-220.

Maurya, S.K., Ram, H. H. and Singh, D.K. (2004). Combining ability analysis in bottle gourd. Prog. Hort. 36 (1): 6772.

Patel, J. K.; Vijay Bahadur; Devi Singh; Prasad, V. M.; Rangare, S. B. 2013. Performance of cucumber (Cucumis sativus L.) hybrids in agro-climatic conditions of Allahabad. HortFlora Res. Spectrum, 2(1):50-55.

Rajawat Kuldeep Singh, John Philip Collis., Gajendra Singh., Jalam Singh, and Ritu Rani Minz. (2017). Varietal Evaluation Studies in Cucumber (Cucumis sativus L.) Genotypes Under Allahabad Agro-Climate Condition Trends in Biosciences 10(2), Print: ISSN 0974-8431, 629- 631, 2017.

Rastogi KB, Arya D. (1990). Variability studies in cucumber (Cucumis sativus L.). J Veg.Sci. 1990; 17(2): 224-226.

Richards, L. A. (1954). Diagnosis and improvement of saline and alkaline soils United States Developments Agency Agriculture Hand Book No.60.

Sahni, G.P., Singh, R.K. and Saha, B. C. (1987). Genotypic and phenotypic variability in ridge gourd (Luffa acutangula Roxb.) Indian J. Agril. Sci. 57: 666-688.