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Mean performance studies for earliness and yield parameters in cucumber (*Cucumis sativus* L.)

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ABSTRACT: So far some studies on mean performance of cucumber have been done in overall India but there is a gap in generating scientific information on performance in cucumber collected overall the In dia spatially and temporally. In this context the present study has been conducted. Mean performance of the 55 genotypes of cucumber was carried out during Summer, 2022 at College of Horticulture, Bagalkot, Karnataka, India. The investigation consisted of 55 cucumber genotypes collected from various parts of India and experiment was laid out in RCB Design. The results indicated the highly significant variation among the genotypes for all the characters studied *viz*., nodes up to first female flower, days to first female flower, days to first harvest, fruit length (cm), fruit diameter (cm), number of fruits per vine, average fruit weight (g) and fruit yield per vine (kg). Means of genotypes varied greatly for several traits, indicating the higher magnitude of variability. Based on the yield parameters, V-5, V-1 and V-6 were superior among the 55 genotypes studied. For earliness parameters, V-17(14)-B-16 and V-4 were superior to fetch the early maturity of the crop.

Keywords: Cucumber, mean performance, variability, earliness, yield.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the important cucurbitaceous crops from economic as well as nutritional point of view. Among the sixty-six species in the genus *Cucumis*, cucumber is the only one with 2*n* = 2x = 14 chromosomes with a small haploid genome of 367 Mbp and having unique properties within its genome (Sharma *et al*., 2017). It is mainly grown for its pickling types and fresh market (slicing). Tender fruits of cucumber used as pickles, dessert fruit, salad and even brined on commercial scale in almost every part of the world (Jat *et al*., 2017). It has been cultivated in India for over 3,000 years. From its centre of diversity, cucumber spread to other parts of the world through two independent routes: westward to Europe around 500 to 1300 CE and eastward to China at around 2,000 years ago (Paris *et al.*, 2012). Currently, cucumbers and gherkins are grown in an area of 21,78,613 hectare with an production of 7,49,75,625 metric tonnes and productivity of 34.41 t/ha in the world (Anonymous, 2014). In India it is grown in an area of 119 thousand hectares with a production of 1694 thousand tonnes and productivity of 14.23 tonnes per hectare (Anonymous, 2021).

In spite of extensive cultivation, economic importance and consumption of cucumbers
as a common vegetable by many people in the country, not many suitable varieties are available for commercial cultivation (Hanchinamani and Patil 2009). Most of the existing open pollinated cultivars or hybrid varieties either have attained a plateau or are restricted to certain regions and have low yield potential whereas hybrid varieties shows narrow adaptation. Low fruiting ability and yield suppression due to the inherent fruiting habits are major limiting factors for cucumber improvement (Lower *et al*. 1982). Unfortunately, very little attention has been paid for its genetic improvement by using genetically superior parents.

So far some studies on mean performance of cucumber have been done in different part India; but there is no light on local genotypes of Karnataka which are preferred by the consumers of Northern Karnataka hence, this study comprised of local genotypes of Karnataka developed at KRCCH, Arabhavi, Karnataka. To address this issue the investigation was selected to study the mean performance of fifty-five genotypes of cucumber collected from various geographical regions of India.

MATERIALS AND METHODS

A. Description of the study area

This experiment was conducted at the Vegetable Science experimental block of College of Horticulture, Bagalkot, Bagalkot District, Karnataka, India.

B. Experimental material

The investigation consisted of 55 cucumber genotypes collected from various parts of India. The list of genotypes used in the study is presented in

Supplementary table 1. The experiment was taken during the Summer month (March) of 2022 at Vegetable Science experimental block, College of Horticulture, Bagalkot in RCBD design with two replications. During February, 2022 repeated ploughing of the experimental plot was followed in order to bring the soil into fine tilth by breaking all the clods, removing all weeds and other plant debris from the experimental plot. Beds of size 50 m length and 1m width, with a height of 20 cm were prepared. Ridges and furrows were opened at a distance of 1.50 meters apart, the distance of 0.75 meters was maintained between plants. Farm yard manure, basal dose of fertilizers and vermicompost were applied to the beds prior to laying of drip laterals and mulching. The 50 per cent recommended dose of nitrogen was applied as basal dose and remaining 50 per cent nitrogen was applied as a top dress on 30th day after sowing.

Totally eight parameters were studied *viz.*, nodes up to first female flower, days to first female flower, days to first harvest, fruit length (cm), fruit diameter (cm), number of fruits per vine, average fruit weight (g) and fruit yield per vine (kg). The data recorded on 55 genotypes were subjected to statistical analysis using MS-Excel, OPSTAT and SPAR 2.0 packages as per the design of experiment.

RESULTS AND DISCUSSION

The mean sum of squares due to various sources of variation for earliness and yield parameters of cucumber genotypes are presented in Table 1. The results indicated the highly significant variation among the genotypes for all the characters studied *viz*., nodes up to first female flower, days to first female flower, days to first harvest, fruit length (cm), fruit diameter (cm), number of fruits per vine, average fruit weight (g) and fruit yield per vine (kg).

Table 1: Mean squares of eight characters from analysis of variance.

Characters	Treatment (df= 54)	Replication (df= 1)	Error (df= 54)
Nodes up to first female flower	3.49**	2.45	0.19
Days to first female flower	83.20**	10.11	1.08
Days to first harvest	86.44**	50.21	0.74
Fruit length	15.19**	8.51	0.22
Fruit diameter	1.63**	0.45	0.01
Number of fruits per vine	10.96**	0.99	0.22
Average fruit weight	999.90**	117.24	2.86
Fruit yield per vine	0.55**	0.10	0.01

Development of superior genotypes requires information about the nature and magnitude of variability present in the available genotypes, depends on the assessment of available data on phenotypic characters that are connected with the yield. Hence 55 cucumber genotypes were evaluated for earliness, yield contributing and yield traits (Table 2 & 3). Nodes to first female flower appearance is one of the notable trait which contribute towards the earliness. Among the cucumber genotypes, lowest node at which first female appeared was V-17(14)-B-16 (3.38) followed by V-5 (3.63) and V-10 (3.88). Another character which determines earliness is days to first female flower appearance, among the 55 genotypes V-1 (44.33 days) has taken the least number of days to female flower appearance followed by V-17(14)-B-16 (44.80 days) and IC-613476 (44.86 days) whereas, Chandra *et al.* (2000) recorded that Poinsette variety has taken 48 days to first female flowering in cucumber.

Early marketable maturity is the basic objective of the entire crop improvement programme and is of immense importance to the vegetable growers from economic point of view. V-4 (51.29 days) has taken least number of days to first harvest followed by V-2 (51.39 days) and IC-613476 (51.46 days). Expected earliness in cucumber in the plastic low tunnel technology is 30-35 days from the date of transplanting (Sidhu and Islam 2008). Fruit length is one of the most important parameters which contribute towards yield, highest fruit length was observed in V-7 (19.49 cm) followed by Sarpan Hybrid-30 (19.12 cm) and Gokak Local (18.77 cm). For fruit diameter, highest fruit diameter was observed in PI-19677 (8.45 cm) followed by IC-539818 (8.25 cm) and IC-430062 (6.55). Number of fruits per vine has a direct bearing on total yield. Among 55 genotypes, V-6 (20.66) had highest number of fruits followed by V-2 (20.15) and Anusha (20.07). Average fruit weight (g) has positive character association with total bearing of the plant. The genotype, V-7 (186.99 g) had highest average fruit weight followed by V-4 (185.47 g) and V-6 (184.34 g). The ultimate goal of any breeding programme is to achieve higher marketable yield per plant. This is a key factor in adoption or rejection of a particular variety or hybrid by the farmer. The genotype, V-5 (3.15 kg) followed by V-1 (3.10 kg) and V-6 (3.08 kg).

Means of genotypes varied greatly for several traits, indicating the higher magnitude of variability. Mean values of genotypes ranged greatly when compared to previous findings for nodes upto first female flower, number of fruits per vine, fruit length and fruit diameter (Kumar *et al*., 2010; Singh *et al*., 2011; Yadav *et al*. 2012) in cucumber. Yadav *et al*. (2012) and Kumar *et al*. (2013) reported similar results for days to first harvest. Similar findings seen with previous research works for fruit yield per vine (Singh *et al*., 2011; Hossain *et al*., 2010; Yadav *et al*., 2012; Afangideh and Uyoh, 2007), average fruit weight (Singh *et al*., 2011; Hossain *et al*., 2010; Afangideh and Uyoh, 2007; Yadav *et al*., 2012) in cucumber.

Supplementary 1. Genetic stock of cucumber used for mean performance study.

Sr. No.	Genotypes	Source of collection	SL. NO.	Genotypes	Source of collection
1	V-8	KRCCH, Arabhavi	29	Punjab Naveen	PAU, Ludhiana
2	V-12	KRCCH, Arabhavi	30	K-75	Dr Y S Parmar UHF, Solan, HP
3	V-5	KRCCH, Arabhavi	31	Sarpan Hybrid-30	Sarpan Seeds Pvt. Ltd.
4	V-1	KRCCH, Arabhavi	32	Anusha	Chiguru Seeds Pvt. Ltd.
5	V-10	KRCCH, Arabhavi	33	NBPGR-14	NBPGR, New Delhi
6	V-2	KRCCH, Arabhavi	34	Poinsette	NBPGR, New Delhi
7	V-6	KRCCH, Arabhavi	35	IC-430062	NBPGR, New Delhi
8	V-7	KRCCH, Arabhavi	36	IC-469811	NBPGR, New Delhi
9	V-9	KRCCH, Arabhavi	37	IC-469840	NBPGR, New Delhi
10	V-4	KRCCH, Arabhavi	38	IC-430050	NBPGR, New Delhi
11	V-6-12	KRCCH, Arabhavi	39	IC-469812	NBPGR, New Delhi
12	V-3	KRCCH, Arabhavi	40	IC-469530	NBPGR, New Delhi
13	V-17(14)-B-16	KRCCH, Arabhavi	41	IC-469994	NBPGR, New Delhi
14	V-17(11)	KRCCH, Arabhavi	42	IC-355960	NBPGR, New Delhi
15	Mahaveer selection	KRCCH, Arabhavi	43	IC-436971	NBPGR, New Delhi
16	Gokak Local	KRCCH, Arabhavi	44	IC-430069	NBPGR, New Delhi
17	VA-CU-02	KRCCH, Arabhavi	45	IC-613481	NBPGR, New Delhi
18	V-15	KRCCH, Arabhavi	46	IC-613472	NBPGR, New Delhi
19	Heera	KAU, Vellanikkara	47	IC-595504	NBPGR, New Delhi
20	Shubra	KAU, Vellanikkara	48	IC-613471	NBPGR, New Delhi
21	Kerala Selection	KAU, Vellanikkara	49	IC-595517	NBPGR, New Delhi
22	Dev Kamal	IIVR, Varanasi	50	IC-248202	NBPGR, New Delhi
23	Himangi	IIVR, Varanasi	51	IC-613476	NBPGR, New Delhi
24	Swarna Ageti	IIVR, Varanasi	52	IC-595515	NBPGR, New Delhi
25	Bagalkot Local	Bagalkot	53	IC-539818	NBPGR, New Delhi
26	Phule Shubangi	MPKV, Rahuri	54	IC-539809	NBPGR, New Delhi
27	Pant Kheera	GBPUA&T, Pantnagar	55	PI-19677	NBPGR, New Delhi
28	Aurangabad Local	Maharastra			

Table 2. *Per se* performance of cucumber genotypes for earliness and yield contributing traits.

Sr. No.	Genotype	Nodes upto first female flower	Days to first female flower	Days to first harvest	Fruit length (cm)	Fruit diameter (cm)
1	V-8	4.80	49.06	57.42	15.00	4.40
2	V-12	5.25	54.00	60.68	12.42	5.70
3	V-5	3.63	46.22	53.61	16.42	4.30
4	V-1	4.75	44.33	52.37	18.23	4.35
5	V-10	3.88	46.93	55.92	14.66	4.65
6	V-2	4.38	47.65	51.39	17.92	4.15
7	V-6	5.13	51.69	60.21	18.74	4.10
8	V-7	4.38	46.34	56.89	19.49	4.85
9	V-9	4.88	45.84	57.48	17.42	4.80
10	V-4	4.63	49.11	51.29	18.26	4.15
11	V-6-12	6.38	60.41	66.41	16.17	5.35
12	V-3	4.75	48.93	60.91	18.17	4.10
13	V-17(14)-B-16	3.38	44.80	53.92	15.17	4.35
14	V-17(11)	4.12	47.32	56.49	13.23	3.26
15	Mahaveer selection	7.25	53.08	62.88	18.24	6.10
16	Gokak Local	4.38	52.01	59.76	18.77	4.25
17	VA-CU-02	8.38	62.87	70.06	12.18	5.35
18	V-15	6.50	46.99	53.25	18.50	4.30
19	Heera	6.63	61.43	68.71	17.27	5.30
20	Shubra	7.13	58.01	65.09	17.73	5.85
21	Kerala Selection	6.75	61.19	69.99	14.24	5.60
22	Dev Kamal	7.88	55.62	61.07	14.82	5.75
23	Himangi	7.50	68.58	73.27	14.82	6.00
24	Swarna Ageti	4.63	47.29	53.90	15.50	5.50
25	Bagalkot Local	5.00	62.65	71.91	14.17	4.10
26	Phule Shubangi	5.25	64.81	73.42	14.17	5.35
27	Pant Kheera	6.13	57.08	65.56	12.16	5.85
28	Aurangabad Local	8.00	58.24	67.43	13.23	5.70
29	Punjab Naveen	6.50	63.07	70.84	15.50	6.25
30	K-75	7.50	65.28	74.57	13.50	5.45
31	Sarpan Hybrid-30	5.63	55.51	62.37	19.12	5.30
32	Anusha	6.13	52.79	60.51	18.17	5.30
33	NBPGR-14	6.38	59.08	64.02	13.20	5.90
34	Poinsette	7.38	51.28	58.44	14.43	5.85
35	IC-430062	7.75	62.96	68.94	13.25	6.55
36	IC-469811	7.88	64.11	72.90	12.23	5.35
37	IC-469840	5.50	55.56	62.87	12.23	6.15
38	IC-430050	6.63	60.24	66.94	11.23	5.85
39	IC-469812	6.38	53.67	63.00	11.17	6.25
40	IC-469530	6.50	55.03	61.36	10.17	5.75
41	IC-469994	6.58	52.85	61.22	12.17	5.20
42	IC-355960	5.00	52.93	60.41	12.82	5.50
43	IC-436971	8.13	53.31	60.30	11.82	5.70
44	IC-430069	8.00	53.17	60.80	11.67	5.70
45	IC-613481	6.63	46.70	57.01	9.00	5.75
46	IC-613472	5.38	49.34	54.78	12.00	6.25
47	IC-595504	5.75	50.44	56.25	13.00	5.15
48	IC-613471	6.63	49.50	54.43	14.00	4.95
49	IC-595517	7.25	50.08	57.96	12.32	5.65
50	IC-248202	7.88	52.93	57.45	13.00	6.25
51	IC-613476	5.13	44.86	51.46	11.17	5.35
52	IC-595515	5.38	47.15	52.88	11.49	6.30
53	IC-539818	5.75	50.23	53.86	13.32	8.25
54	IC-539809	4.75	49.97	55.27	11.62	6.02
55	PI-19677	5.63	49.92	60.42	10.75	8.45
	Mean	6.04	53.82	61.26	14.57	5.44
	S. Em ±	0.31	0.74	0.61	0.34	0.06
	CD (5%)	0.88	2.09	1.73	0.95	0.18
	CD (1%)	1.17	2.78	2.30	1.27	0.24

Table 3: *Per se* performance of cucumber genotypes for yield traits.

Sr. No.	Genotype	Number of fruits per vine	Average fruit weight (gm)	Fruit yield per vine (kg)
1	V-8	18.00	154.23	2.52
2	V-12	19.17	143.74	2.53
3	V-5	18.17	164.49	3.15
4	V-1	16.17	181.25	3.10
5	V-10	15.34	173.74	2.95
6	V-2	20.15	154.24	2.77
7	V-6	20.66	184.34	3.08
8	V-7	14.17	186.99	2.80
9	V-9	15.17	177.24	2.82
10	V-4	18.25	185.47	2.35
11	V-6-12	14.69	147.49	1.92
12	V-3	16.17	154.47	2.30
13	V-17(14)-B-16	19.17	162.11	2.72
14	V-17(11)	17.64	135.52	1.98
15	Mahaveer selection	16.17	148.88	2.03
16	Gokak Local	13.23	153.98	1.96
17	VA-CU-02	14.19	118.38	1.75
18	V-15	19.06	153.95	2.35
19	Heera	15.17	140.72	2.29
20	Shubra	15.12	156.32	2.21
21	Kerala Selection	13.23	153.36	1.72
22	Dev Kamal	14.17	166.86	2.65
23	Himangi	13.32	173.97	2.28
24	Swarna Ageti	16.17	156.21	2.47
25	Bagalkot Local	18.19	161.36	2.38
26	Phule Shubangi	15.19	141.75	1.85
27	Pant Kheera	15.19	122.67	1.67
28	Aurangabad Local	11.73	131.47	1.85
29	Punjab Naveen	18.17	147.32	2.30
30	K-75	16.25	100.24	1.96
31	Sarpan Hybrid-30	18.17	155.35	2.22
32	Anusha	20.07	164.31	2.54
33	NBPGR-14	13.78	124.23	1.50
34	Poinsette	12.34	143.34	1.86
35	IC-430062	15.19	126.88	1.51
36	IC-469811	12.19	119.76	1.30
37	IC-469840	12.44	108.42	1.12
38	IC-430050	13.32	97.97	1.28
39	IC-469812	11.67	131.34	1.70
40	IC-469530	13.48	122.31	1.38
41	IC-469994	15.66	120.47	1.86
42	IC-355960	16.59	116.19	1.97
43	IC-436971	14.28	138.94	1.65
44	IC-430069	13.32	126.97	1.38
45	IC-613481	15.67	157.47	1.91
46	IC-613472	17.27	161.63	2.28
47	IC-595504	16.17	147.41	2.22
48	IC-613471	18.31	126.38	2.26
49	IC-595517	15.15	126.75	1.45
50	IC-248202	17.32	144.98	1.97
51	IC-613476	16.16	155.43	2.28
52	IC-595515	15.16	139.22	1.67
53	IC-539818	17.17	149.95	2.02
54	IC-539809	16.67	182.17	2.76
55	PI-19677	14.67	102.77	1.25
	Mean	15.82	146.26	2.13
	S. Em ±	9.32	1.20	0.10
	CD (5%)	0.96	3.39	0.28
	CD (1%)	1.28	4.51	0.37

CONCLUSION

The main aim of the crop improvement is to improve yield, hence selection of the genotypes places an very important role. Selection of parents for hybridisation programme plays an important role in crop improvement and mean performance plays an very important role. Based on the yield parameters, V-5, V-1 and V-6 were superior among the 55 genotypes studied. For earliness parameters, V-17(14)-B-16 and V-4 were superior to fetch the early maturity of the crop. These genotypes can be used in the future breeding programme to serve as the best parents for earliness and yield characters.

FUTURE SCOPE

As climate change continues to impact global weather patterns, understanding the performance in genotype

responses to different environmental conditions becomes essential. Studying variability helps identify and preserve genetic diversity within crop populations. This genetic diversity is a valuable resource for crop improvement programs. By selecting and breeding for desirable traits, such as disease resistance, higher yields, and nutritional content, researchers can develop improved crop varieties.

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Conflict of interest. Nil.

REFERENCES

Afangideh, U. and E. A. Uyoh. (2007). Genetic Variability and correlation studies in some varieties of cucumber (*Cucumis sativus* L.). *Jordan Journal of Agricultural Sciences, 3*(4), 376–384.

Anonymous. (2021). Area and production of horticulture crops for 2021-2022. Ministry of Agriculture and Farmers Welfare, Government of India.

Anonymous. (2014). *Food and Agriculture Organization Corporate Statistical Database*, Rome.

Chandra, P., Sirohi, P. S., Behera, T. K. and Singh, A. K. (2000). Cultivating vegetables in polyhouse. *Indian Horticulture, 45*(3), 17-32.

Hanchinamani, C. N. and Patil, M. G. (2009). Heterosis in cucumber (*Cucumis sativus* L.). *Asian Journal of Horticulture, 4*, 21-24.

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 Research Publications Journal, 4*(3), 297-311.

Jat, G. S., Munshi, A. D., Behera, T. K., Singh, A. K. and Kumari, S. (2017). Genetic analysis for earliness and yield components using gynoecious and monoecious lines in cucumber (*Cucumis sativus* L). *Chemical Science Review and Letters***,** *6*, 1075-1079.

Kumar, J., Munshi, A. D., Kumar, R., Sureja, A. K. and Sharma, R. K. (2010). Combining ability and its relationship with gene action in slicing cucumber. *Indian Journal of Horticulture, 7*(1), 135-138.

Kumar, S., Dharminder, K., Ramesh, K., Thakur, K. S. and Balbir, S. D. (2013). Estimation of genetic variability and divergence for fruit yield and quality traits in cucumber (*Cucumis sativus* L.) in North-Western Himalayas. *Universal Journal of Plant Science, 1*(2), 27-36.

Lower, R. L., Nienhius, J. and Miller, C. H. (1982). Gene action and heterosis for yield and vegetative characteristics in a cross between a gynoecious pickling cucumber inbred and a *Cucumis sativus* var. *hardwickii* R line. *Journal of the American Society for Horticultural Science, 107*, 75-78.

Paris, H. S., Daunay, M. C. and Janick, J. (2012). Occidental diffusion of cucumber (*Cucumis sativus*) 500–1300 CE: two routes to Europe. *Annals of Botany, 109*(1),117-126.

Sharma, S., Pradhan, S., Khajuria, P. and Dar, A. A. (2017). Genetic diversity studies in cucumber (*Cucumis sativus* L.) using RAPD markers. *Vegetable Science, 44*(1), 34-37.

Sidhu, A. S. and Islam, S. (2008). Vegetables: Technologies for year around production. In: Chadha K. L., Singh A. K. and Patel V. B. (eds). *Recent initiatives in Horticulture.* The Hort. Sci. of India, New Delhi. pp 470-480.

Singh, S. K., Singh, A. and Gangwar, L. K. (2011). Variability and heritability studies in cucumber. *Progressive Agriculture, 11*(1), 166-167.

Yadav, Y. C., Sanjay, K. and Raghavendra, S. (2012) Studies on genetic variability, heritability and genetic advance in cucumber (*Cucumis sativus* L.). *HortFlora Research Spectrum, 1*, 34-37.

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