

## Evaluation of different Genotypes of Cucumber (*Cucumis sativus*) for ~~different~~ Yield and its Contributing Traits

Comment [a1]: delete

### Abstract

The present study consisted of 30 genotypes of cucumber including one check (Pusa Uday) laid out in Completely Randomized Block Design with three replications. Evaluation was done for fourteen different traits viz., days to first male flower appear, days to first female flower appear, node number at which female flower appear, days to first fruit harvest, number of primary branches per plant, inter-nodal length, vine length, fruit length, fruit diameter, average fruit weight, T.S.S, number of fruit per plant, fruit yield per plant (kg), fruit yield per hectare(q). The genotypes NDCU-23-1 followed by NDCU-23-11 and NDCU-23-12 performed better than the check variety i.e. Pusa Uday in term of fruit yield per plant.

Comment [a2]: Put data (ranges of corresponding traits)

Comment [a3]: put fruit yield information in the abstract

**Keyword:** Cucumber, genotypes, evaluation, replication.

### Introduction

Cucumber (*Cucumis sativus* L.) is important summer season vegetable crop commonly known as kheera. It has a diploid chromosome number of  $2n=2x=14$  and its fruits are botanically classified as seeded pepo. India being native place of cucumber is endowed with enormous genetic variability in its vegetative and fruit characters (Pati *et al.*, 2015). ~~China is considered the secondary center for diversity of cucumber (Sebastinaet al., 2010).~~ Cucumber is primarily an annual warm-season crop that can be cultivated in both tropical and subtropical climates. It is typically grown twice a year, during the summer and rainy seasons. ~~In north India plains, crop is sown in (February-March) and rainy (June-July) season.~~

~~It is an ideal summer vegetable crop chiefly grown for its edible tender fruits, preferred as a salad ingredient, pickles, and as a cooked vegetable (Shah *et al.*, 2016).~~ It has very high water

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Normal, Space Before: 0 pt

content about 90 – 95% and hence satisfies thirst, has cooling effect and prevents indigestion. It has therapeutic properties for treating jaundice and prevention of constipation.

Immature fruit are consumed as salad and sell at a premium price in off- season. Fruit varies in shape, size and colour and are considered nutritious. They contain 0.4% protein, 2.5% carbohydrates, 1.5mg iron and 2mg of vitamin C per 100g fresh weight. (Thamburaj and Singh, 2018). Recently, one new improved variety Pusa Long Green (DC-83) has been released and recommended by AICRP (vegetable crops) for commercial cultivation in Punjab, Uttar Pradesh, Bihar and Jharkhand during both spring summer and *kharif* season based on multi location trail. It was noted that apart from superior quality characters, Pusa Long Green (DC-83) showed 34.93% higher yield (Average yield under normal conditions is 18.93 t/ha) over the National check variety Pant Khira-1. Our study was also to find out different traits among 30 genotypes of cucumber.

## Materials and Methods

The final experimental materials comprising thirty genotypes were sown in Completely Randomized Block Design (CRBD) with three replications during *Zaid*, 2023. Each treatment consisted of twelve plants in two rows, having spacing of 1.5 x 0.6 m with net plot size of 3.0 × 3.0 m<sup>2</sup>. Seeds of thirty genotypes of cucumber were sown during third week of March. The crop was cultivated following recommended cultural practices conducted by Department of Vegetable Science, ANDUA&T, Ayodhya.

The data were collected on fourteen character such as days to first male flower appear, days to first female flower appear, node number at which first female flower appear, days to first fruit harvest, number of primary branches per plant, inter-nodal length (cm), vine length (m), fruit length (cm), fruit diameter (cm), average fruit weight (g), number of fruits per plant, fruits yield per plant (kg), fruits yield per hectare (q), total soluble solids (°brix).

## Results and Discussion

Data regarding various traits are represented under in Table 1.

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Normal, Space Before: 0 pt, Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Font: (Default) Times New Roman, 12 pt, Not Bold, Font color: Black

Formatted: Font: (Default) Times New Roman, 12 pt, Font color: Black

Formatted: Font: (Default) Times New Roman, 12 pt, Not Bold, Font color: Black

Formatted: Font: (Default) Times New Roman, 12 pt

Formatted: Font: (Default) Times New Roman, 12 pt, Not Bold

Formatted: Font: (Default) Times New Roman, 12 pt

NDCU-23-1 reported minimum days to first male flower appearance (29.13) followed by NDCU-23-11 (29.37), while VRCU-2218 (45.03) took maximum days to first male flower appear followed by VRCU-2247 (44.40). Study conducted by Mishra *et al.* (2021) showed similar result where he observed days to first male flower appears ranged from 38.33 to 44.67. Minimum days to first female flower appearance after seed sowing reported by NDCU-23-1 (32.60) followed by NDCU-23-4 (34.57), whereas VRCU-2218 (51.13) followed by VRCU-2246 (50.91) took maximum days. Similar result was found by Mishra *et al.* (2021) that days to first female flower appear range from 45.33 to 52.67. Genotype NDCU-23-1 (5.77) followed by NDCU-23-11 (6.45) recorded the lowest node number at which first female flower appear whereas VRCU-2218 (12.63) followed by VRCU-2212 (11.97) recorded maximum number for node number at which first female flower appear. Similar observation was reported by Yadav *et al.* (2021) where he reported that node number to first female flower appear range from 3.00 to 11.33. Maximum number of primary branches per plant at the time of final harvesting was reported by NDCU-23-1 (2.50) followed by NDCU-23-12 (2.40), while VRCU-2226 (1.00) followed by VRCU-2219 (1.03) showed minimum number of primary branches per plant. Similar result was observed by Kumari *et al.* (2020) where she was found that number of primary branches per plant ranged 1.63 to 2.97. Maximum inter-nodal length was assessed in NDCU-23-5 (9.74) followed by VRCU-2219 and minimum inter-nodal length was observed for Pusa Uday (6.13) followed by NDCU-23-9 (6.47). ~~In a similar result found by Mishra *et al.* (2021) where he reported that inter nodal length ranged 7.33 to 12.00.~~ Genotype NDCU-23-1 (2.38m) closely followed by NDCU-23-8 (2.06m) recorded longest vine length at the time of final harvest. In contrast, NDCU (1.60m), followed by VRCU-2205 (1.69m) recorded minimum vine length. Bhैया *et al.* (2020) where he founded that vine length ranged 1.18 to 2.73. ~~Data represented under Table 1.~~

NDCU-23-1 (39.30) showed earliness for days to first fruit harvest followed by NDCU-23-4 (41.67) and VRCU-2246 (60.43) took maximum days to first fruit harvest followed by VRCU-2218 (60.27). Similar result was observed by Bhैया *et al.* (2020) where he founded that days to first fruit harvest ranged 47.63 to 60.50. In case of fruit length, genotype VRCU-2218 (16.95cm) followed by NDCU-23-1 (16.62cm) showed longest fruit length while it was minimum for NDCU-23-10 (11.75cm) followed by NDCU-23-7 (13.39cm). Similar result was observed by Kumari *et al.* (2020) where she was found that fruit length ranged 10.20 to 18.68. Genotype

NDCU-23-1 (5.03) followed by NDCU-23-4 (4.97) showed maximum fruit diameter, whereas it was minimum in VRCU-2247 (3.52) followed by NDCU-23-8 (3.57). ~~The result is in line with Yadav *et al.* (2021) where he reported that fruit diameter ranged 3.9 to 5.51.~~ Result of average fruit weight showed that it was maximum in NDCU-23-1 (199.06g) closely followed by NDCU-23-11(192.43-194.23g) and minimum in VRCU-2226 (138.28g) followed by VRCU-2217 (143.05g). These findings are consistent with Mishra *et al.* (2021) where he reported that range of average fruit weight was 127.33 to 184.33. Maximum number of fruits per plant was found in NDCU-23-1(9.00) followed by VRCU-2226 (8.93) while it was minimum for VRCU-2247 (19.33) followed by NDCU-23-3 (6.13). ~~Similar observation was reported by Yadav *et al.* (2021) where he reported that number of fruits per plant ranged 4.13 to 12.13.~~ NDCU-23-1(1.79kg) followed by NDCU-23-11(1.70kg) showed highest fruit yield per plant whereas VRCU-2212(0.99kg) followed by VRCU-2249(1.00kg) showed minimum yield per plot. ~~Similar result was observed by Bhaiya *et al.* (2020) where he founded that fruit yield per plant ranged 1.01 to 1.83.~~ Maximum number of fruits yield per hectare(q) was found in NDCU-23-1(143.13) followed by NDCU-23-11(135.90) while it was minimum for VRCU-2212(79.48) followed by VRCU-2249 (79.73). Similar observation was reported by Yadav *et al.* (2021) where he founded that fruit yield per hectare ranged 104.6 to 346.46. ~~Data represented under Table 1.~~

**Table:1 Mean performance of 30 genotypes for fourteen characters in Cucumber**

<b>Genotypes</b>	<b>Days to first male flower appear</b>	<b>Days to first female flower appear</b>	<b>Node no at which first female flower appear</b>	<b>Days to first fruit harvest</b>	<b>No of primary branches per plant</b>	<b>Inter-nodal length</b>	<b>Vine length</b>	<b>Fruit length (cm)</b>	<b>Fruit diameter (cm)</b>	<b>Average fruit weight (g)</b>	<b>No of fruits per plant</b>	<b>T.S.S</b>	<b>Fruit yield per plant (kg)</b>	<b>Fruit yield per hectare(q)</b>
<b>NDCU-23-1</b>	29.13	32.60	5.77	39.30	2.50	7.01	2.38	16.62	5.03	199.06	9.00	1.86	1.79	143.13
<b>NDCU-23-2</b>	31.33	35.80	6.63	45.70	2.07	8.52	1.80	15.71	3.85	189.04	7.20	2.06	1.36	108.73
<b>NDCU-23-3</b>	33.80	38.00	9.37	47.67	1.90	7.50	1.60	14.86	4.15	165.87	6.13	1.89	1.01	81.18
<b>NDCU-23-4</b>	30.93	34.57	6.53	41.67	1.70	7.43	1.90	15.71	4.97	191.23	8.88	1.84	1.62	129.18
<b>NDCU-23-5</b>	39.40	43.17	9.87	52.43	1.57	9.74	1.73	15.04	3.66	154.71	6.60	1.97	1.02	81.49
<b>NDCU-23-6</b>	43.87	47.97	9.13	57.33	1.77	7.15	1.98	14.01	4.45	150.23	7.27	1.92	1.09	87.15
<b>NDCU-23-7</b>	37.40	41.07	8.37	50.87	1.60	8.21	1.86	13.39	4.08	160.41	7.33	1.77	1.17	93.84
<b>NDCU-23-8</b>	35.60	40.23	8.60	48.77	1.30	7.26	2.06	14.61	3.57	156.45	6.73	1.74	1.13	90.13
<b>NDCU-23-9</b>	33.87	37.73	7.63	46.13	1.40	6.47	1.86	15.05	4.31	163.60	6.80	1.87	1.12	89.46
<b>NDCU-23-10</b>	34.33	36.60	10.23	47.47	1.67	8.39	1.91	11.75	3.64	161.80	7.47	1.84	1.20	96.27
<b>VRCU-2203</b>	39.67	44.57	9.47	54.85	1.33	9.66	1.78	14.19	4.64	156.47	7.53	1.63	1.18	94.27
<b>VRCU-2205</b>	41.60	49.23	7.80	58.37	1.20	8.92	1.69	15.52	3.91	153.71	7.93	1.88	1.22	97.93
<b>VRCU-2209</b>	35.93	41.47	8.47	53.27	1.40	7.14	1.76	15.67	3.65	147.97	7.20	1.87	1.07	85.29
<b>VRCU-2210</b>	38.53	46.93	10.10	57.27	1.70	7.04	1.83	14.27	3.76	156.83	7.47	1.89	1.17	93.93
<b>VRCU-2212</b>	43.17	48.13	11.97	58.67	1.50	7.27	1.75	14.44	4.27	145.03	6.87	1.60	0.99	79.48
<b>VRCU-2213</b>	41.13	45.73	9.97	56.87	1.07	7.97	1.85	15.40	3.68	150.20	6.93	1.72	1.06	84.51

<b>VRCU-2217</b>	41.77	44.90	9.20	55.33	1.50	8.60	1.99	15.47	4.48	143.05	7.53	1.79	1.07	85.80
<b>VRCU-2218</b>	45.03	51.13	12.63	60.27	2.00	9.01	1.78	16.96	4.28	149.45	8.00	1.83	1.21	96.72
<b>VRCU-2219</b>	42.30	46.93	8.43	57.87	1.03	9.73	1.72	15.47	4.34	152.79	9.00	1.59	1.38	110.46
<b>VRCU-2224</b>	38.00	43.10	8.60	53.40	1.23	8.83	1.75	15.44	4.46	162.34	7.00	1.68	1.14	90.78
<b>VRCU-2226</b>	42.83	47.33	10.33	57.93	1.00	9.10	1.77	14.60	3.75	138.29	8.93	1.42	1.24	99.19
<b>VRCU-2236</b>	41.93	46.43	10.13	58.20	1.30	8.81	1.73	15.03	4.01	144.87	7.67	1.44	1.11	88.60
<b>VRCU-2244</b>	39.20	44.77	8.87	54.80	2.00	8.05	1.93	14.70	4.51	160.54	8.40	1.58	1.35	107.92
<b>VRCU-2245</b>	40.97	45.70	7.83	56.60	1.68	8.32	1.70	15.60	3.74	151.16	7.53	1.74	1.14	91.05
<b>VRCU-2246</b>	43.47	50.91	11.53	60.43	1.33	9.38	1.63	14.13	4.60	158.44	6.80	1.74	1.08	86.51
<b>VRCU-2247</b>	44.40	49.10	9.40	58.20	1.70	7.63	1.73	14.43	3.52	170.83	5.93	1.65	1.01	80.98
<b>VRCU-2249</b>	43.60	48.23	10.07	59.87	1.82	7.57	1.83	14.39	3.80	148.85	6.73	1.70	1.00	79.73
<b>NDCU- 23-11</b>	29.37	34.87	6.45	44.00	2.35	8.08	2.00	16.15	4.72	192.43	8.80	1.90	1.70	135.90
<b>NDCU-23-12</b>	30.83	35.17	6.57	43.68	2.40	7.78	1.93	15.83	4.67	194.23	8.63	1.80	1.64	131.53
<b>PusaUday (Check)</b>	31.87	36.27	7.52	44.17	2.00	6.13	1.88	15.55	4.61	185.40	8.47	1.83	1.57	125.43
<b>Mean</b>	38.18	42.95	8.92	52.71	1.63	8.09	1.84	15.00	4.17	161.84	7.56	1.77	1.23	98.22
<b>C.V.</b>	6.68	6.76	6.53	5.62	6.36	6.44	8.64	8.26	8.20	6.16	11.99	3.64	12.27	10.96
<b>S.E.</b>	1.47	1.68	0.34	1.71	0.06	0.30	0.09	0.72	0.20	5.76	0.52	0.04	0.09	6.22
<b>C.D. 5%</b>	4.17	4.74	0.95	4.84	0.17	0.85	0.26	2.02	0.56	16.30	1.48	0.11	0.25	17.60
<b>C.D. 1%</b>	5.55	6.31	1.27	6.44	0.23	1.13	0.35	2.69	0.74	21.69	1.97	0.14	0.33	23.42
<b>Range Lowest</b>	29.13	32.60	5.77	39.30	1.00	6.13	1.60	11.75	3.52	138.29	5.93	1.42	0.99	79.48
<b>Range Highest</b>	45.03	51.13	12.63	60.43	2.50	9.74	2.38	16.96	5.03	199.06	9.00	2.06	1.79	143.13

## Acknowledgement

It is a uniquely proud privilege to me for expressing my deep emotion & immense gratitude to my Major Advisor Dr. Aastik Jha, Assistant Professor Department of Vegetable Science for his meticulous guidance, constant inspiration and encouragement, incessant forbearance, peerless criticism coupled with befitting counsels throughout the investigation and preparation of this manuscript. I simply felt blessed to be provided with an academic advisor like him.

## Conclusion

Cucumber (*Cucumis sativus*.) is one of the major summer season cucurbitaceous crops. This study aimed to evaluate 30 genotypes of cucumber for fourteen traits. The genotypes NDCU-23-1 followed by NDCU-23-11 and NDCU-23-12 performed better than the check variety i.e. Pusa Uday in term of fruit yield per plant. The result shows a wide range of variation in almost all economically important traits, indicating substantial potential for improvement through various breeding methods.

## Reference

- Bhaiya, R., Singh, V.B., Yadav, G.C., Kumar, Y. and Tiwari, D. 2020. Character association and path coefficient analysis of growth, yield, and its contributing traits in cucumber (*Cucumis sativus* L.). *Int. J. Chem. Stud.* 8(5), 431-433.
- Kumari, M., Ram, C.N., Nath, S., Maurya, N. and Kumar, S., 2020. Studies on genetic variability, heritability and genetic advance in cucumber (*Cucumis sativus* L.). *J. PharmacognPhytochem.* 9(5): 481-484.
- Mishra, S.K., Roy, S., Kumar, N., & Prasad, V.M. (2021). Genetic evaluation of cucumber (*Cucumis sativus* L.) genotypes for yield and yield contributing traits. *J. PharmacognPhytochem.*, 10(1), 2872-2874.
- Pati, K., Munshi, D.A. and Behera, K.T. 2015. Inheritance of gynoecism in Cucumber (*Cucumis sativus* L.) using genotype GBS-1 as gynoecious parent. *Genetika.* 47(1): 349-356.
- Sebastian, P., Schaefer, H., Telford, I. R. and Renner, S. S. 2010. Cucumber (*Cucumis sativus*) and melon (*C. melo*) have numerous wild relatives in Asia and Australia, and the sister species of melon is from Australia. *Proc. Natl. Acad. Sci. U.S.A.* 107(32): 14269-14273.

Formatted: Line spacing: single

Shah, K.N., Rana, D.K. and Singh, V. 2016. Studies on genetic divergence in cucumber (*Cucumis sativus* L.) under subtropical conditions of Garhwal Himalaya. *Int. J. Adv. Sci. Res. Manag.* 2(2): 39-42.

Thamburaj, S. and Singh, N. 2018. *Vegetable Tuber Crops and Spices*. New Delhi: ICAR. (7th ed., pp. (254-261).

Yadav, S., Singh, D.K., Singh, S.S., Bisht, Y.S. and Bhatt, R. 2021. Assessment of genetic variability in cucumber (*Cucumis sativus* L.). *Int J Chem Stud.* 9(1): 3347-3349.

**Comment [a4]:** references should be in Journal style.

UNDER PEER REVIEW