



# EVALUATION AND CHARACTERIZATION OF COWPEA (*VIGNA UNGUICULATA* (L.) WALP.) GENOTYPES FOR GROWTH, YIELD AND QUALITY PARAMETERS

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## Abstract

Cowpea [*Vigna unguiculata* (L.) Walp.] genotypes were evaluated and characterized for growth, yield and quality parameters. All the parameters showed significant differences among all the genotypes under study. Among the different growth parameters studied, the highest vine length was recorded by the genotype Sabarmati (444.40 cm); while the genotype 2012/COPBVAR-1 (24.27) recorded the highest number of primary branches per plant. The genotype 2012/COPBVAR-5 (300.80) recorded the highest number of leaves per plant. With regards to flowering behaviour, the genotype BG- 12 showed the earliness with minimum days for first flowering (61.38 days) and lowest days to fifty per cent flowering is recorded in genotype 2012/COPBVAR-6 (70.85 days). Regarding the yield and yield attributes the genotype BG-12 showed earliness in first harvest (78.98 days). The genotype 2012/COPBVAR-6 (15.97 days) showed lowest number of days from flowering to harvest. The highest number of pods per plant was recorded in genotype GREENFALL (158.00), whereas the maximum pickings were recorded in genotype LOBIYA VAR. BLACK (15.67). The highest pod yield per plant, yield per plot and yield per ha were recorded with KUR- MOHINI (1033.33 g, 10.33 kg and 38.27 tonnes) respectively. The genotype GREENFALL recorded the highest pod length (58.20 cm). The genotype YB 07(LOBIYA) recorded highest number of seeds per pod (21.33). The genotype 2012/COPBVAR-6 recorded highest pod weight (15.55 g). Regarding the chemical composition, The highest T.S.S content was observed in genotype LOBIYA VAR. BLACK (7.27 °B) and The highest value for the ascorbic acid content was recorded in the genotype 2012/COPBVAR-6 (17.21 mg).

**Key words :** Cowpea, Genotypes, Evaluation, TSS, Ascorbic acid.

## Introduction

Vegetables are the integral part of our daily diet. It plays an important role in nutritional security and economy of small and marginal farmers. In India, different types of vegetables are grown around the years. Our country is the second largest producer of vegetables next to china with an estimated annual production of about 162.18 Million tonnes from an area of 92.05 lakh ha area with the productivity of 17.6 MT/ha (Anonymous, 2013). Cowpea [*Vigna unguiculata* (L.) Walp] belonging to family Leguminosae is a nutritious vegetable consumed as tender pods, shelled beams as well as dry beans. It has many synonyms like snake bean, asparagus bean,

body bean due to its long slender pods. It is observed that cowpea genotypes grown in Allahabad agro climatic region show wide variation in growth and yield contributing characters. Different genotypes are grown in various localities and they have well adapted to different regions. Such variability is an immense potential to find out promising genotypes having long pods with high yield. Development of high yielding genotypes is of immense importance to the farmer for increasing production as well as productivity.

## Materials and Methods

The experiment was conducted at horticulture experimental field, Department of Horticulture, Allahabad

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school of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences (SHIATS), Allahabad (U.P) during *Kharif* season, 2014-15. The material for the study comprised of 14 cowpea cultivars, of which 7 were collected from IIVR, Varanasi and 7 were collected locally. The cultivars were raised in field experiment in randomized block design with three replications. Growth, yield and quality parameter data were collected at appropriate times throughout the experimental period from five randomly selected plants from each plot. The data for following growth, yield and quality parameters recorded *viz.*, number of leaves, number of primary branches, length of vine, number of days to first flowering, number of days to 50% of flowering, pod yield per plant, plot and hectare, pod length, pod weight and number of seeds per pod, TSS content and ascorbic acid content were recorded. The data collected on different parameters was subjected to statistical analysis as per method of analysis of variance Fisher (1918). The significance and non significance of the treatment effect were judged with the help of 'F' variance ratio test. Calculated 'F' value (variance ratio) was compared with the table value of 'F' at 5% level of significance. If calculated value exceeded the table value, the effect was considered to be significant.

## Results and Discussion

The genotype Sabamati (444.40 cm) had recorded

the highest vine length, which was significantly superior over rest of the genotypes except GREENFALL (444.00 cm), KUR- MOHINI (439.33 cm), KASHI KANCHAN (437.73 cm) and 2012/COPBVAR-2 (426.60 cm). The lowest vine length was observed in the genotype CHANDINI (297.67 cm) with mean of 388.51 cm. Similar results were reported by Nigude *et al.* (2004) in cowpea and Sawardekar (2007) in yard long bean.

The highest number of primary branches was recorded in the genotype G<sub>4</sub> (24.27), which was at par with the genotypes KUR- MOHINI (21.87), CHANDINI (21.73), SABARMATI (21.60), YB 07 (LOBIYA) (21.33) and 2012/COPBVAR-3 (21.27), LOBIYA VAR. BLACK (20.87) and KASHI KANCHAN (20.87). The lowest number of primary branches reported in genotype 2012/COPBVAR-5 (16.80) with mean of 20.68 cm. These results are in line with Pal *et al.*, (2003), Nigude *et al.* (2004) in cowpea and Sawardekar (2007) in yard long bean.

The highest number of leaves was recorded in genotype 2012/COPBVAR-5 (300.80) and was at par with the CHANDINI (287.27) and 2012/COPBVAR-2 (263.80). The lowest number of leaves was noticed in genotype ARKA GARIMA (C) (204.20). These results are in line with Selvam *et al.* (2000) in cowpea and Sawardekar (2007) in yard long bean

The genotype BG-12 (61.38 days) showed earliest

**Table 1 :** Evaluation of Cow pea genotypes for growth and flowering parameters.

S. No.	Genotypes/ Varieties	Length of vine	Number of Primary branches	Number of leaves	Number of days to first flowering	Number of daysto 50% of flowering
1	ARKA GARIMA(C)	365.4	19.8	204.2	61.97	75.37
2	2012/COPBVAR-5	410.53	16.8	300.8	63.06	76.23
3	2012/COPBVAR-2	426.6	20.33	263.8	65.39	78.19
4	2012/COPBVAR-1	373.13	24.27	247.8	73.79	86.75
5	2012/COPBVAR-3	374.87	21.27	257.27	66.72	81.64
6	KASHI KANCHAN	437.73	20.87	251.93	63.60	76.82
7	2012/COPBVAR-6	368.07	20.33	224.4	63.84	70.85
8	YB 07(LOBIYA)	357.07	21.33	248.8	65.33	74.14
9	GREENFALL	444	20.87	214.87	64.38	76.39
10	KUR- MOHINI	439.33	21.73	240.13	66.71	80.13
11	CHANDINI	297.67	20.47	287.27	63.45	75.87
12	BG- 12	345.6	19	243.6	61.38	71.48
13	SABARMATI	444.4	21.6	235.51	64.12	74.04
14	LOBIYA VAR. BLACK	354.8	20.87	240.58	64.23	76.18
	<b>Range</b>	58.20 – 17.17	444.40 – 297.67	24.27 – 16.80	300.80 – 204.20	61.38 – 73.79
	<b>Mean</b>	30.94	388.51	20.68	247.21	64.86
	<b>Results</b>	S	S	S	S	S
	<b>S.E. m ±</b>	1.672	4.733	0.385	2.526	0.594
	<b>C.D. at 5%</b>	4.860	13.758	1.12	0.331	1.727

flowering and was at par with 2012/COPBVAR-6 (63.84 days), KASHI KANCHAN (63.60 days) and CHANDINI (51.00 days) YB 07(LOBIYA) (63.33 days) and 2012/COPBVAR-5 (63.03 days). These results are in line with Narayanankutty *et al.* (2003) in cowpea and Sawardekar (2007) in yard long bean.

The lowest days for fifty per cent flowering were recorded in the genotype 2012/COPBVAR-6 (70.85 days), which was at par with the genotype BG-12 (71.48 days) and was significantly superior over rest of the treatments. It was followed by the genotypes SABARMATI (74.04 days) with mean 76.72 days. These results are in line with Benchasri and Bairaman (2010) in cowpea and Sawardekar (2007) in yard long bean.

The variation in yield attributing character *viz.*, days to first harvest, days from flowering to harvest, number of pickings, pod yield per plant (g), pod yield per plot (kg) and per hectare (t) varied significantly in all cowpea genotypes under study. The lowest days required to first harvest were noticed in the genotype BG-12 (78.98 days) where as The genotype 2012/COPBVAR-1 (93.12 days) recorded the highest days to first harvest with mean of 76.72 days. Similar results were reported by Narayanankutty *et al.* (2003) in cowpea and Sawardekar

(2007) in yard long bean.

The genotype 2012/COPBVAR-6 (15.97 days) recorded significantly the lowest number of days from flowering to harvesting; the genotype 2012/COPBVAR-1 (23.44 days) noticed the highest number of days from flowering to harvest with population mean of 19.57 days. These results are in line with Nigude *et al.* (2004), Narayanankutty *et al.* (2003) in cowpea and Sawardekar (2007) in yard long bean .

The highest number of pods per plant was exhibited in genotype GREENFALL (158.00) and was at par with genotypes KUR- MOHINI (149.00), YB 07(LOBIYA) (148.67) and LOBIYA VAR. BLACK (139.00) and significantly superior over genotypes KASHI KANCHAN (103.67), 2012/COPBVAR-6 (127.67), SABARMATI (128.67). The genotype ARKA GARIMA(C) (58.67) recorded the lowest number of pods with population mean of 110.50. These results are in line with Nigude *et al.* (2004), Narayanankutty *et al.* (2003) in cowpea and Sawardekar (2007) in yard long bean.

The highest number of pickings was recorded in genotype LOBIYA VAR. BLACK (15.67), which was at par with the genotypes YB 07(LOBIYA) (15.33), KUR-MOHINI, GREENFALL, 2012/COPBVAR-6 (15.00).

**Table 2 :** Evaluation of cow pea genotypes for yield and yield attributing characters.

S. No.	Genotypes/ Varieties	Days to first harvesting	Days from flowering to harvesting	Number of pods per plant	Number of picking	Pod yield per plant (g)	Pod yield per plot (kg)	Pod yield per hectare (t)
1	ARKA GARIMA(C)	83.22	19.78	58.67	13.00	355.00	3.55	13.14
2	2012/COPBVAR-5	82.12	18.83	99.67	14.33	700.33	7.00	25.93
3	2012/COPBVAR-2	83.28	21.19	77.00	11.33	543.33	5.43	20.12
4	2012/COPBVAR-1	93.12	23.44	127.67	14.00	813.67	8.14	30.13
5	2012/COPBVAR-3	87.79	19.81	74.67	12.67	420.00	4.20	15.55
6	KASHI KANCHAN	80.43	16.44	103.67	15.00	761.00	7.61	28.18
7	2012/COPBVAR-6	79.56	15.97	110.67	15.00	668.33	6.68	24.69
8	YB07(LOBIYA)	83.84	21.33	148.67	15.33	943.67	9.44	34.94
9	GREENFALL	80.17	19.14	158.00	15.00	1028.00	10.27	38.05
10	KUR- MOHINI	82.30	18.08	149.00	15.00	1033.33	10.33	38.27
11	CHANDINI	84.44	22.38	90.67	12.67	706.67	7.07	26.17
12	BG-12	78.98	19.33	81.00	12.00	566.67	5.67	20.99
13	SABARMATI	81.03	19.44	128.67	13.00	811.67	8.12	30.06
14	LOBIYA VAR. BLACK	83.22	21.30	139.00	15.67	919.67	9.20	34.06
	<b>Range</b>	93.12– 78.98	15.97– 23.44	158.00– 58.67	15.67– 11.33	1033.33– 355.00	10.33– 3.55	38.27– 13.14
	<b>Mean</b>	83.28	19.75	110.50	13.86	733.67	7.34	27.16
	<b>Results</b>	S	S	S	S	S	S	S
	<b>S.E. m +</b>	0.777	0.764	1.664	0.610	10.351	0.103	0.385
	<b>C.D. at 5%</b>	2.259	2.222	4.837	1.773	30.091	0.300	0.331

The lowest pickings were recorded in 2012/COPBVAR-2 (11.33) with population mean of 13.86. These results are in line Sawardekar (2007) in yard long bean.

The highest pod yield per plant was recorded in genotype KUR- MOHINI (1033.33 g), which was at par with genotypes GREENFALL (1028.00 g), YB 07(LOBIYA) (943.67 g), LOBIYA VAR. BLACK (919.67 g), 2012/COPBVAR-1 (813.67 g) and significantly superior over genotypes KASHI KANCHAN (761.00 g), CHANDINI (706.67 g) and 2012/COPBVAR-5 (700.33 g). The genotype ARKA GARIMA(C) (355.00 g) noticed the lowest pod yield per plant with mean 733.67 g. Similar results were reported by Peksen and Peksen *et al.* (2013) in cowpea and Sawardekar (2007) in yard long bean.

The highest pod yield per plot was recorded in genotype KUR- MOHINI (10.33 kg), which was at par with genotypes GREENFALL (10.27 kg), YB 07 (LOBIYA) (9.44 kg), LOBIYA VAR. BLACK (9.20 kg), 2012/COPBVAR-1 (8.14 kg) and significantly superior over genotypes KASHI KANCHAN (7.61 kg), CHANDINI (7.07 kg) and 2012/COPBVAR-5 (7.00 kg). The genotype ARKA GARIMA(C) (3.55 kg) noticed the lowest pod yield per plant with mean 7.34 kg. These results are in line with Singh *et al.* (2006) in cowpea and Sawardekar (2007) in yard long bean.

The pod yield per hectare varied significantly. The

highest pod yield per hectare was recorded in genotype KUR- MOHINI (38.27 t/ha), which was at par with genotypes GREENFALL (38.05 t/ha), YB 07(LOBIYA) (34.04 t/ha), LOBIYA VAR. BLACK (34.06 t/ha), 2012/COPBVAR-1 (30.13 t/ha) and significantly superior over genotypes KASHI KANCHAN (28.18 t/ha), CHANDINI (26.17 t/ha) and 2012/COPBVAR-5 (25.93 t/ha). The genotype ARKA GARIMA(C) (13.14 t/ha) noticed the lowest pod yield per hectare with mean 27.16 t/ha. These results are in line with Singh *et al.* (2006) in cowpea and Sawardekar (2007) in yard long bean.

The highest pod length was recorded in genotype GREENFALL (58.20 cm), which was at par with genotype 2012/COPBVAR-6 (42.16 cm) and significantly superior over genotypes SABARMATI (37.57 cm), 2012/COPBVAR-5 (35.97 cm), KASHI KANCHAN (30.14 cm), BG- 12 (27.20), CHANDINI (38.14 cm), and KUR-MOHINI (26.42 cm). The lowest pod length was recorded (17.17 cm) by ARKA GARIMA(C) with mean of 30.94 cm. These results are in line with Akande *et al.* (2009) in cowpea and Sawardekar (2007) in yard long bean.

Significantly the highest number of seeds per pod was noticed in genotype YB 07(LOBIYA) (21.33), which was at par with GREENFALL (20.87) and was superior over rest of the genotypes. The genotype ARKA GARIMA(C) showed the lowest (13.33) seeds per pod

**Table 3 :** Evaluation of cowpea genotypes for Qualitative characters.

S. No.	Genotypes/ Varieties	Length of pod (cm)	Weight of pod (g)	Number of seeds per pod	Total soluble solids (TSS °B)	Ascorbic acid content
1	ARKA GARIMA(C)	17.17	5.33	13.33	6.60	13.90
2	2012/COPBVAR-5	35.97	11.70	13.47	5.70	14.56
3	2012/COPBVAR-2	18.47	4.33	17.87	6.63	16.65
4	2012/COPBVAR-1	24.53	8.47	16.47	6.27	14.05
5	2012/COPBVAR-3	25.87	7.00	17.20	7.10	15.43
6	KASHI KANCHAN	30.14	7.20	16.53	5.80	14.73
7	2012/COPBVAR-6	42.16	15.55	20.40	5.70	17.21
8	YB 07(LOBIYA)	38.60	12.98	21.33	6.60	16.54
9	GREENFALL	58.20	13.43	20.87	6.17	17.16
10	KUR- MOHINI	26.43	7.93	15.47	5.40	13.86
11	CHANDINI	26.79	11.77	17.93	5.53	15.69
12	BG- 12	27.20	7.13	17.80	5.73	13.41
13	SABARMATI	37.57	7.52	16.67	7.20	14.65
14	LOBIYA VAR. BLACK	24.04	7.80	16.33	7.27	16.42
	<b>Range</b>	58.20– 17.17	15.55– 4.33	21.33– 13.33	7.27– 5.40	17.21– 13.41
	<b>Mean</b>	30.94	9.15	17.26	6.26	15.30
	<b>Results</b>	S	S	S	S	S
	<b>S.E. m +</b>	1.672	1.348	0.638	0.114	0.351
	<b>C.D. at 5%</b>	4.860	3.920	1.855	0.331	1.021

with mean 17.26. These results are in line with Akande *et al.* (2009) in cowpea and Sawardekar (2007) in yard long bean.

Significantly the highest weight of pod was reported by 2012/COPBVAR-6 (15.55 g) and was significantly superior over all the genotypes except genotype GREENFALL (13.43 g). The lowest pod weight was recorded in the genotype 2012/COPBVAR-2 (4.33 g) with population mean of 9.15 g. These results are in line with Akande *et al.* (2009) in cowpea and Sawardekar (2007) in yard long bean.

The highest T.S.S content genotypes LOBIYA VAR. BLACK (7.27 °B), SABARMATI (7.20 °B) and 2012/COPBVAR-3 (7.10 °B). Whereas the lowest T.S.S was noted in the genotype KUR- MOHINI (5.40 °B) with mean 6.26 °B. These results are in line Sawardekar (2007) in yard long bean.

The highest value for the ascorbic acid content was recorded in the genotype 2012/COPBVAR-6 (17.21 mg), which was significantly superior over all genotypes except genotype GREENFALL (17.16 mg). The lowest value for ascorbic acid content was noticed in genotype BG-12 (13.41 mg) with mean of (15.30 mg). These results are in line with Ushakumari *et al.* (2000) in cowpea and Sawardekar (2007) in yard long bean.

### Conclusion

It was concluded that, all the characters *viz.*, growth parameters, flowering behaviour, yield and yield attributing characters, pod parameters were varied significantly. Further, while studying the flowering behaviour, G<sub>12</sub> found to be the earliest. The G<sub>10</sub>, G<sub>9</sub> and G<sub>8</sub> had noticed more yields per plant, per plot and per ha under Allahabad agro climatic conditions. These genotypes also recorded desirable values for pod parameters like length of pod, weight of pod and quality attribute like Ascorbic acid content which are parameters deciding a better market acceptability. Thus, on the basis of growth characters, flowering behaviour, yield and yield attributing characters, pod parameters and G<sub>10</sub>, G<sub>9</sub> and G<sub>8</sub> were found to be promising. However, it needs confirmation by conducting same investigation for next 2-3 seasons.

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