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Evaluation of different Cowpea (*Vigna unguiculata* (L.) Walp.) Varieties for growth and pod yield in Prayagraj Agro-climatic conditions

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Abstract
An experiment was conducted to find out the best suitable varieties of Cowpea in Prayagraj Agro-climatic conditions in the Vegetable Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (SHUATS), Prayagraj (U.P.), during Kharif season of the year 2021. Fifteen genotypes including two check varieties are evaluated and the experiment was laid out in randomized block design with three replications. The observation were recorded on growth and pod yield traits. And the results revealed that among all the genotypes AVT II 2019/ COPBVAR -4 performed well in earliness parameters *viz.* Days to first flowering (30.33days) and Days to 50% flowering (35.33days). In terms of Pod Length maximum was recorded in PUSA BARSATI (31.07cm). Pod Diameter was maximum in AVT II 2019/COPBVAR-4 (7.94mm). Weight of 10 pods was maximum in KASHI KANCHAN (118.0 grams). And among all the genotypes AVT II 2019/COPBVAR-2 performed will in yield parameters *viz.* Yield per plant (177.13 grams) and yield per hectare (177.13 Quintals).

Keywords: Cowpea, pod yield, growth

Introduction
Cowpea (*Vigna unguiculata* sub sp. *unguiculata* and sub sp. *sesquipedalis*) also known as yard long bean is one of the most important legume vegetable grown throughout the world. In India it is grown widely round the year. Cowpea is grown both for its tender pods and also for its dry seeds used as pulse for culinary purposes. Cowpea belongs to the family Leguminosae, sub-family Fabaceae and genus *Vigna*. There are five distinct sub species of cowpea, out of which two are wild, *viz. dekinotiana* and *mensensis* and three are cultivated in India. They are *V. unguiculata* subsp. *unguiculata*, subsp. *cylindrical* and sub sp. *sesquipedalis.*
The pods are rich in Protein, vitamin B and minerals. It is used as a fodder and green manure crop. Africa is considered to be the centre of origin for cowpea as non-specific wild forms are found in Africa. The most probable progenitor of cowpea is var. *mensensii.*
Cowpea is vigorously growing annual with strong tap root system, stems prostrate. The leaves are trifoliate and alternate. Flowers white, auxiliary, 2-3 flowers on each peduncle, pods 20-30 cm long, cylindrical and slightly curved.
The performance of different Cowpea varieties varies under different Agro-climatic conditions due to their specific climatic requirement. Therefore, an appraisal of varieties for their variability with respect to growth and yield under different conditions is essential to improve the production. Diversity in varieties of vegetables and other crops developed by various research institutes is considerable importance in any crop improvement programme.

Materials and Methods
The present investigation was carried out with 15 genotypes of cowpea collected from different sources. The experiment was conducted in randomized block design with three replications during kharif season of 2021, at Vegetable Research Farm, Department of Horticulture, SHUATS, Prayagraj (U.P.), India. Observation was recorded on five randomly selected plants of each genotype from each replication for the fourteen quantitative characters i.e., Number of days to germination, Plant Height after 30 days, Plant Height after 60 days, Days to 1st Flower Appearance, days to 50% flowering, Number of Branches/Plant, Number of Pods/Plant, Pod Length (cm), Pod diameter (mm), 10 Pods Weight (gm), pod colour, Green

Pod Yield/Plant (grams), Yield per hectare (quintals).

Genotype	Genotype Name	Source
G_1	IET 2021/ COPBVAR-1	IIVR,VARANASI
G_2	IET 2021/ COPBVAR-2	IIVR,VARANASI
G_3	IET 2021/ COPBVAR-3	IIVR,VARANASI
G_4	IET 2021/ COPBVAR-4	IIVR,VARANASI
G_5	IET 2021/ COPBVAR-5	IIVR,VARANASI
G_6	IET 2021/ COPBVAR-6	IIVR,VARANASI
G_7	IET 2021/ COPBVAR-7	IIVR,VARANASI
G_8	AVT II 2019/ COPBVAR-1	IIVR,VARANASI
G_9	AVT II 2019/ COPBVAR-2	IIVR,VARANASI
G_{10}	AVT II 2019/ COPBVAR-3	IIVR,VARANASI
G_{11}	AVT II 2019/ COPBVAR-4	IIVR,VARANASI
G_{12}	AVT II 2019/ COPBVAR-5	IIVR,VARANASI
G_{13}	AVT II 2019/ COPBVAR-6	IIVR,VARANASI
G_{14}	PUSA BARSATI	SODHAI RAM AND SONS
G_{15}	KASHI KANCHAN	SODHAI RAM AND SONS

Results and Discussion

Plant height at 30 days (cm)

The maximum Plant height at 30 days was recorded in the variety IET 2021/ COPBVAR- 7 (65.20cm), followed by IET 2021/COPBVAR -5 (61.47cm) and minimum plant height at 30 days was recorded in the variety AVT II 2019/COPBVAR-3 (35.13cm). Similar findings were previously reported by Kandel P *et al.,* (2019) [8] in cowpea.

Plant height at 60 days

The Maximum Plant height at 60 days was recorded in KASHI KANCHAN (108.67cm), followed by IET 2021/COPBVAR-7(97.33cm). And minimum Plant height at 60 days was recorded in the variety IET 2021/ COPBVAR-2 (49.27 cm). Similar findings were previously reported by Kandel P *et al.,* (2019) [8] in cowpea.

Number of branches per plant

The Maximum Number of Branches per plant (14.87) was recorded in the variety KASHI KANCHAN, followed by PUSA BARSATI (12.30) and minimum Number of Branches per plant (6.90) was recorded in the variety IET 2021/ COPBVAR-4. Similar findings were previously reported by Sharma P *et al.,* (2019) [8] in Cowpea.

Days to first flowering

The Minimum days to first flowering was recorded in AVT II 2019/ COPBVAR- 4 (30.33), followed by AVT II 2019/ COPBVAR- 4(32.00). And Maximum number of days to First Flowering was recorded in the variety AVT II 2019 / COPBVAR-2. (37.67). Similar findings were previously reported by Sharma P *et al.,* (2019) [8] in Cowpea.

Days to 50% flowering

The Minimum days to 50% flowering was recorded in AVT II 2019/ COPBVAR- 4 (35.33), followed by AVT II 2019/ COPBVAR-6(37.67). And Maximum number of days to 50% Flowering was recorded in the variety AVT II 2019 / COPBVAR-2. (43.67). Similar findings were previously reported by Sharma P *et al.,* (2019) [8] in Cowpea.

Pods per cluster

Maximum number of pods per cluster (3.40) was recorded in the variety IET 2021 / COPBVAR-7, followed by IET 2021/ COPBVAR-2 (3.13) and minimum number of pods per cluster was recorded in the variety AVT II 2019/ COPBVAR-6 (2.33). Similar findings were previously reported by Subedi S *et al.,* (2019) [8].

Pod diameter in mm

Maximum pod diameter (7.94mm) was recorded in the variety AVT II 2019/ COPBVAR-4, followed by AVT II 2019/ COPBVAR-2 (7.58mm) and minimum pod diameter (4.84mm) was recorded in the variety IET 2021/ COPBVAR-5. Similar findings were previously reported by Gupta S *et al.,* (2019) [8] in Cowpea.

Pod length in cms

Maximum pod length (31.07cm) was recorded in the variety PUSA BARSATI, followed by IET 2021/COPBVAR-6 (27.93 cm) and minimum pod length was recorded in the variety IET 2021/COPBVAR-5 (10.77cm). Similar findings were previously reported by Gupta S *et al.,* (2019) [8] in Cowpea.

10 Pods weight grams

Maximum weight of 10 pods was recorded in the variety KASHI KANCHAN (118.0 g), followed by IET 2021/COPBVAR-6 (85.71), and minimum 10 pods weight was recorded in the variety AVT II 2019/COPBVAR-1 (22.44g). Similar findings were previously reported by Gupta S *et al.,* (2019) [8] in Cowpea.

Pods per plant

Maximum number of pods per plant (42.33) was recorded in the variety AVT II 2019/COPBVAR-5, followed by AVT II 2019/COPBVAR-3 (39.67) and minimum number of pods per plant was recorded in the variety IET 2021/COPBVAR- 1 (7.33).

Yield per plant in grams

Maximum yield per plant was recorded in the variety AVT II 2019/COPBVAR- 2(177.13 g) followed by KASHI KANCHAN (169.03g) and minimum yield per plant was recorded in the variety IET 2021/COPBVAR-7 (66.20 g). Similar findings were previously reported by Kandel P *et al.,* (2019) [8] in cowpea.

Yield per hectare in quintals

Maximum yield per hectare was recorded in the variety AVT II 2019/COPBVAR- 2 (177.13q), followed by KASHI KANCHAN (169.03q) and minimum yield per hectare was recorded in the variety IET 2021/COPBVAR-7(66.20q). Similar findings were previously reported by Kandel P *et al.,* (2019) [8] in cowpea.

Table 1: Evaluation of different Cowpea varieties with respect to Plant height, days to flowering, pods per plant, pod diameter, pod length, pod yield

S. No.	Genotype	Days to germination	Plant height at 30 days (cm)	Plant Height at 60 days (cm)	Days to first flowering	Days to 50% flowering	Pods per plant	Pod diameter in (mm)	Pod length in (cm)	Yield per plant in grams (g)	Yield per Hectare in quintals (q)
G_1	IET 2021/ COPBVAR-1	5.00	35.20	57.00	33.67	39.00	7.33	6.61	26.07	71.51	71.51
G_2	IET 2021/ COPBVAR-2	3.00	36.93	49.27	37.67	43.67	27.33	7.08	18.70	100.23	100.23
G_3	IET 2021/ COPBVAR-3	4.67	38.47	56.00	37.00	40.67	30.67	6.60	27.90	128.57	128.57
G_4	IET 2021/ COPBVAR-4	3.00	41.40	62.67	36.00	40.00	29.00	6.15	15.87	104.07	104.07
G_5	IET 2021/ COPBVAR-5	3.00	61.47	85.67	33.00	38.67	32.00	4.84	10.77	70.18	70.18
G_6	IET 2021/ COPBVAR-6	3.00	37.00	54.00	33.33	39.00	23.33	6.92	27.93	131.80	131.80
G_7	IET 2021/ COPBVAR-7	3.00	65.20	97.33	37.00	44.33	17.67	5.29	14.59	66.20	66.20
G_8	AVT II 2019/ COPBVAR- 1	3.00	34.57	56.00	32.67	44.00	40.00	4.93	13.75	73.10	73.10
G_9	AVT II 2019/ COPBVAR- 2	3.00	38.67	53.00	35.67	42.67	38.33	7.58	25.70	177.13	177.13
G_{10}	AVT II 2019/ COPBVAR- 3	3.00	35.13	53.67	36.00	40.00	39.67	6.33	24.80	168.95	168.95
G_{11}	AVT II 2019/ COPBVAR- 4	3.00	46.33	63.00	30.33	35.33	33.67	7.94	26.57	160.49	160.49
G_{12}	AVT II 2019/ COPBVAR- 5	3.33	37.73	49.67	32.00	39.00	42.33	6.84	26.20	157.04	157.04
G_{13}	AVT II 2019/ COPBVAR- 6	3.00	37.73	52.67	34.00	37.67	32.33	7.20	27.20	146.25	146.25
G_{14}	PUSA BARSATI	3.00	51.73	92.13	33.67	42.00	35.00	6.49	31.07	105.41	105.41
G_{15}	KASHI KANCHAN	3.00	57.67	108.67	34.67	43.67	25.67	6.27	23.37	169.03	169.03
	F	S	S	S	S	S	S	S	S	S	S
	SE(d)	0.17	3.65	4.90	0.91	1.19	4.45	0.21	0.67	16.44	16.44
	CD at 5%	0.34	7.35	9.87	1.83	2.39	8.96	0.43	1.34	33.13	33.13
	CV	6.34%	10.23%	9.08%	3.22%	3.58%	17.99%	4.03%	3.59%	16.51%	16.51%

Conclusion

The results from the current investigation concluded that maximum Green pod yield per hectare was observed in AVT II 2019/COPBVAR-2, and earliness was observed in the variety AVT II 2019/ COPBVAR-4.

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