



Evaluation of Different Genotypes of Cowpea (*Vigna unguiculata* L.) for Growth, Yield & Quality under Prayagraj Agro-climatic Condition

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/jeai/2024/v46i102959>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/122744>

Original Research Article

Received: 24/07/2024

Accepted: 26/09/2024

Published: 14/10/2024

ABSTRACT

The experiment was conducted at Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj during 2022-23 in order to standardize the best genotype of Cowpea. KASHI NIDHI (G₈) found to be the earliest (3.0). The Cowpea genotypes KASHI NIDHI (G₈) had noticed more yields per plant (587g), and per ha (168.03t/ha) under Allahabad agro climatic conditions. This variety also recorded desirable values for pod parameters like length of pod (32.53cm), weight of pod (110.07g), which are parameters deciding a better market acceptability. Thus, on the basis of

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growth characters, flowering behavior (36.87), and yield attributing characters, pod parameters and Cowpea genotypes KASHI NIDHI (G₈) found to be promising. The highest profit and maximum benefit cost ratio (2.89) were observed in cowpea genotypes KASHI NIDHI (G₈).

Keywords: Cowpea; varieties; growth; yield; quality.

1. INTRODUCTION

Cowpea [*Vigna unguiculata* (L.) Walp.] is one of the several species of the widely cultivated genus *Vigna*. Cowpea is a diploid species with a somatic chromosome number $2n=22$ [1]. It is one of the most important pulse crops native to West Africa [2]. Cowpea is called as a poor man's meat or vegetable meat due to its high amount of protein [3,4]. The young leaves, pods, and peas contain vitamins and minerals, which are used for human consumption and animal feed. Cowpea can withstand a considerable degree of drought and high rainfall and can be grown in almost all kinds of soils provided there is proper drainage [5,6]. Cowpea is mainly grown in tropical and subtropical regions in the world for vegetable and grain purpose and to a lesser extent as a fodder crop [7]. It is a most versatile pulse crop because of its smothering nature, drought tolerant characters, soil restoring properties and multi-purpose uses [8]. As a pulse crop, cowpea fits well into most of the cropping systems. It is cultivated for its seed (green or dried), pods and/or leaves, which are consumed in a fresh form as a green vegetable, while snacks and main meal dishes are prepared from the dried grain [9].

It is an annual long trailing vine, indeterminate in growth habit. Leaves are trifoliate and green in colour. Flowers have papilionaceous types of corollas with violet blue to pale pink flower. Pods are long, slender and pendant with sparsely arranged bold seeds [10]. The pods have great demand in gulf countries and large quantities are exported to Middle East. When dried, tender pods and green shelled seeds are consumed as a vegetable and a pulse [11,12]. It can also be used as a green manure, fodder, cover, or catch crop. Considering the nutritive value, 100g of green pods of cowpea contain energy (34.00 kcal), protein (4.20mg), calcium (10.00mg), iron (4.70mg), vitamin A (2.40mg), vitamin C (35.00mg) and is also a good source of Lysine (Anonymous, 2006). Among the different pulses grown in the world, cowpea is grown in 14.13 million hectares with production of 4.51 MT and the productivity of 387.45 kg/ha-1 [13,14,15]. In India, the cowpea is grown in an area of about

3.91 million hectares with a production of 2.22 (+000 MT) having a productivity of 564.15kg seed ha-1. A mean temperature of 27°C is optimum for pod formation and seed yield, though; it performs better in region with rainfall of 250-100mm per annum. Loamy soil is considered the best for the cultivation of cowpea with a pH value of 6- 7 for optimum growth. Varieties with shorter maturity dates are available for gardeners with a less lengthy summary [16,17]. Apart from this, cowpea forms excellent forage and it gives a heavy vegetative growth and covers the ground so well that it checks the soil erosion. As a leguminous crop, it fixes about 70-240 kg/ha of nitrogen per annum [18,19,20,4]. Cowpea is mainly grown in tropical and subtropical regions in the world for vegetable and seed purpose and to lesser extent as a fodder crop [21-29].

2. MATERIALS AND METHODS

The materials used and methods adopted in the present experiment was carried during the Kharif season of 2023 at the Crop Research Farm at Department of horticulture, Naini agriculture college, SHUATS, Prayagraj (U.P.) during the academic year 2022-24. The experiment was laid out in RBD considering the nature of factors under study and the convenience of agricultural operation and efficiency, the experiment was laid out in Randomized Block Design comprised of 9 treatment combinations along with three replications. All the Genotype details include via; G₁ (AVT-II 2021/COPBVAR-1), G₂ (AVT-II 2021/ COPBVAR-2), G₃ (AVT-II 2021/ COPBVAR-3), G₄ (AVT-II 2021/COPBVAR-4), G₅ (AVT-II 2021/COPBVAR-5), G₆ (AVT-II 2021/COPBVAR-6), G₇ (AVT-II 2021/ COPBVAR-7), G₈ (KASHI NIDHI) , G₉ (KASHI SUDHA). The data were recorded at 20, 40, 60 days with 1st, 2nd, 3rd harvesting.

3. RESULTS AND DISCUSSION

Days of 1st germination: The data pertaining to the mean Days of 1st germination as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1. The maximum day of germination (6.0

days) was observed in cowpea genotypes AVT-II 2021/COPBVAR-1 and followed with cowpea genotypes AVT-II 2021/ COPBVAR-3 (5.00 days). The minimum days of germination (3.0 days) was observed in cowpea genotypes with followed in cowpea genotypes KASHI NIDHI.

Plant height: The data pertaining to the mean plant height as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1. The Plant height of cowpea was recorded at 20, 40 and 60 Days after sowing (DAS). At 60 DAS maximum plant height was observed in Cowpea genotype Kashi Nidhi (105.67cm), followed by in was cowpea genotypes AVT-II 2021/COPBVAR-5 (85.67cm). The minimum was (49.27cm) in Cowpea genotype AVT-II 2021/COPBVAR-1.

Similar results were reported by Nigude et al. [30] in cowpea and Sawardekar [31] in yard long bean. Also Kumar et al. [9] and Dongarkar et al. [32]. Reason (Sheetal varieties is pole type and genetic make-up climate adoptability Under Prayagraj Agro-climatic condition).

Days of first flowering: The data pertaining to the mean Days to first flowering, as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1. The minimum number of Days of first flowering was observed in Kashi Nidhi (33.33days), followed by AVT-II 2021/COPBVAR-5 with (33.48 days) and whereas maximum was (37.6Days) recorded in AVT-II 2021/COPBVAR-1. The genotypes of Kashi Nidhi given minimum days to first flowering and observed due to the different location might be due to the favourable Agro-climatic condition and variation in studied genotypes. Similar results observed by Dadson et al. [33] and Sharma P et al. [34].

Days of 50% of flowering: The data pertaining to the mean Days to 50% flowering as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1. The minimum number of Days of first 50% flowering was recorded in Kashi Nidhi (38.67 days), followed by AVT-II 2021/COPBVAR-5 with and (39.67days) and whereas maximum was (44.32) recorded in AVT-II 2021/COPBVAR-1. The genotypes of Kashi Gouri given minimum days to 50% flowering and observed due to the different location might be due to the favourable Agro-climatic condition and variation in studied genotypes. Similar results

observed by Dadson et al. [33] and Sharma P et al. [34].

Number of Pod/plant: The data pertaining to the mean Number of Pod /plant as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1. The Number of Pod/plant of cowpea was recorded at 1st, 2nd and 3rd harvest after sowing (DAS). At 3rd harvest maximum Number of Pod/plant was recorded in Kashi Nidhi (12.64), followed by Kashi Sudha with (11.96) and minimum was (8.65) recorded in AVT-II 2021/COPBVAR-1. Maximum Number of Pod/plants was recorded in Kashi Nidhi due to favourable condition and better adaptability under Prayagraj Agro-climatic condition. Similar results of number of pods per plant was observed by Fageria et al. [35] and Subedi S et al. [36].

Days to first picking: The data pertaining to the mean plant height as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1. The maximum Number of Days of pod first picking was recorded in AVT-II 2021/COPBVAR-1 (56.68 days) and minimum was (42.31) recorded in Kashi Nidhi and Kashi Sudha as followed by (44.93 days). Days to first picking in various cowpea genotypes was recorded in Kashi Nidhi due to favourable condition, different location might be due to different Agro-climatic condition. Similar results of number of pods per plant was observed by Fageria et al. [35] and Subedi S et al. [36].

Yield parameter: The data pertaining to the mean on Pod length(cm), Single pod weight (g), 10 Pod weight per plant (g), Days of pod maturity in plant, No. of seed per pod and Seed Colour as influenced by different treatment was recorded periodically during the crop growth stages and is presented in Table 1.

Pod per length (cm) of cowpea the maximum pod length (cm) recorded in Kashi Nidhi (36.83cm), followed by AVT-II 2021/COPBVAR-7 with (34.53) and minimum was (13.33) recorded in AVT-II 2021/COPBVAR-5. Similar findings were previously reported by Gupta S et al. [37].

Number of Seeds/pod, the maximum number of seeds/pods was recorded in Kashi Nidhi (14.53), followed by Kashi Sudha with (12.33) and minimum was (10.93) recorded in AVT-II 2021/COPBVAR-1.

Table 1. Evaluation of different genotypes of cowpea (*Vigna unguiculata* L.) for growth, yield & quality parameters

Notion	Days of Germination	Plant Height after 60 days	Days of first flowering	50 % of flowering days	Flower colour	Pod colour	Number of Pod/plant (3 rd harvesting)	Days to first picking	Days of pod maturity in plant	Pod yield per plant (g)	Pod yield [t/ha]
G₁	6	49.27	37.67	43.33	White	Light green	8.65	56.68	70.67	108.13	4.68
G₂	3.5	58.02	33.67	43.67	Yellow	Green	11.01	55.24	53.13	117.33	8.32
G₃	4.7	56.5	38.3	40.67	Light yellow	Green	10.95	48.27	62.67	166.8	6.27
G₄	3.1	62.67	35.5	41.24	Yellow	Light green	9.12	46.30	58.33	169.87	6.1
G₅	3.3	85.67	33.48	39.28	White	Light green	10.3	50.45	59.6	156.67	5.98
G₆	4	54.05	33.62	39.5	Light yellow	Green	11.7	52.01	69.27	176	6.15
G₇	3.1	97.33	36.2	42.05	Yellow	Green	9.66	47.56	62.53	177.27	8.18
G₈	3	105.67	33.33	38.67	White	Light green	12.64	42.31	52.07	187.27	11.09
G₉	3	94.13	34.67	43.67	Yellow	Green	11.96	44.93	54.13	128.27	9.26
SEd(±)	0.17	4.9	1.19	2.09	-	-	0.86	0.67	1.46	10.968	0.49
CD_{5%}	0.34	9.79	2.59	5.37	-	-	1.72	1.34	3.02	22.638	1.01
CV	5.34	9.05	3.68	12.32	-	-	8.6	3.54	14.91	111.75	4.99

Seed Colour: Pod colour recorded as Light colour was found in AVT-II 2021/COPBVAR-1, AVT-II 2021/COPBVAR-2, AVT-II 2021/COPBVAR-3, Dark Green colour was found in AVT-II 2021/COPBVAR-4, AVT-II 2021/COPBVAR-5. Green colour was found in AVT-II 2021/COPBVAR-6, AVT-II 2021/COPBVAR-7, Kashi Nidhi, Kashi Sudha.

The result of present findings are similar to that of Muhammad et al. [38], Dwivedi et al. [39], and Gupta S et al. [37] who characterized cowpea genotypes for various agromorphological characters like leaf shape, plant type, twining tendency, colour of flower and pod, days to first flower and days to maturity.

Pod yield (Q/ha): The first picking Yield (g) in plant of cowpea The Pod Yield (q/ha) in plant of cowpea maximum was recorded in Kashi Nidhi (168.03q/h), followed by AVT-II 2021/COPBVAR-3 with (128.57q/ha) and minimum was (5.98) recorded in AVT-II 2021/COPBVAR-1. The maximum yield is Kashi Nidhi variety pod yield due to favourable Agro-climatic condition. Similar results of seed yield was observed by Basaran et al. [40]; Quaye et al. (2011). Kandel P et al. [41].

4. CONCLUSION

Based on the findings from the experiment, it was concluded that all the observed characteristics, including growth parameters, flowering behavior, yield and yield-attributing factors, as well as pod parameters, showed significant variation. Among the Cowpea genotypes studied, KASHI NIDHI (G8) was identified as the earliest in terms of flowering behavior. Additionally, this genotype exhibited higher yields per plant and per hectare under the agro-climatic conditions of Prayagraj. KASHI NIDHI (G8) also recorded favorable values for pod parameters, such as pod length and weight, which are critical for market acceptability. Consequently, based on growth characteristics, flowering behavior, yield and its contributing factors, and pod parameters, Cowpea genotypes KASHI NIDHI (G8) and KASHI SUDHA (G9) were found to be promising. However, further confirmation is needed by repeating the investigation over the next 2-3 seasons. The experimental findings also indicated that the highest profit and maximum benefit-cost ratio (3.70) were achieved with these genotypes.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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