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Evaluation of performance of cowpea genotypes (*Vigna unguiculata* L.) for growth, yield & quality under Prayagraj agro-climatic condition

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Abstract

The experiment “Evaluation of performance of cowpea genotypes (*Vigna unguiculata* L.) for growth, yield & quality under Prayagraj agro-climatic condition” was conducted at Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj during 2023-24 in order to standardize the best genotype of Cowpea. IET2023/COPBVAR-6 (G₆) found to be the earliest (4.91). The Cowpea genotypes IET2023/COPBVAR-6 (G₆) had noticed more yields per plant (277 g), and per ha (285 Q/ha). Under Allahabad agro climatic conditions. These variety also recorded desirable values for pod parameters like length of pod (34.20cm), weight of 10 pod (158 g), which are parameters deciding a better market acceptability. Thus, on the basis of growth characters, flowering behavior (36.87), yield and yield attributing characters, pod parameters and Cowpea genotypes IET2023/COPBVAR-6 (G₆) and Cowpea genotypes IET2023/COPBVAR-6 (G₆) were found to be promising. The highest profit and maximum benefit cost ratio (4.91) were observed in cowpea genotypes IET2023/COPBVAR-6 (G₆).

Keywords: Cowpea, Varieties, growth, yield and quality

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 $2n=22$. It is one of the most important pulse crops native to West Africa Cowpea is called as a poor man’s meat or vegetable meat due to its high amount of protein. 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. 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. It is a most versatile pulse crop because of its smothering nature, drought tolerant characters, soil restoring properties and multi-purpose uses. 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 (Kumar and Shrikant 2017) ^[9, 10].

Cowpea is a warm- season, self-pollinated annual herb with a wide range of growth habit and response to photoperiod. It is grown throughout India for its long green pods as vegetable, seeds as pulse and foliage as vegetable and fodder. When grown for dry seeds, it is also known as black-eye pea, kaffir pea, china pea and southern bean. The cultivars grown for their immature green pods which are used as vegetable are variously known as yardlong bean, asparagus bean and snake bean.

Materials and Methods

Experimental Site

The experiment was conducted during the *rabi* season of 2023 at the Crop Research Farm, Department of Horticulture, SHUATS, Prayagraj. The Crop Research Farm is situated at 25° 57’ N latitude, 87° 19’ E longitude and 98 m altitude from the sea level. This area is situated on the

right side of the river *Yamuna* and by the opposite side of Prayagraj city. All the facilities required for crop cultivation are available.

Climate and Soil

The climate of this region is typically sub-tropical and semi-arid with monsoon commencing by the third week of June and with drawing by end of September. The temperature reached up to 48°C and in winter it goes down to as low as 2-3°C. During the summer hot scorching winds known as “Loo” and frost during winter months are common features. The experimental site is levelled land with sandy loam soil of uniform fertility status with low clay and high sand percentage. Soil samples were collected randomly from depth of 0-30 cm and the soil was analysed for pH (6.9), electrical conductivity (0.36), organic carbon (0.358%), available nitrogen, available phosphorus (150.5kg/ha), and available potassium (225.5kg/ha).

Manure and Fertilizers

The quantity of manure and fertilizer were applied according to recommended doses for cowpea *i.e.*, 25 t/ha FYM or compost along with fertilizers N: P: K @ 25:75:60 kg per ha. FYM was well incorporated in plots. Half dose of nitrogen, full dose of phosphorus and potash were applied as basal dose. The remaining half dose of nitrogen was applied at 3rd week of

sowing.

Observation Recorded: Growth Parameters, Reproductive Parameters and Yield parameters

Results and Discussion

Plant height in various cowpea genotypes

The Plant height of cowpea are presented in Table no.1 at 20, 40 and 60 Days after sowing (DAS). At 20 DAS maximum plant height (22.21cm) in IET2023/COPBVAR-6 it is followed by in cowpea genotypes IET2023/COPBVAR-5 (21.00 cm). The minimum plant height (18.60 cm) in Cowpea genotype IET2023/COPBVAR-1

At 40 DAS maximum plant height was observed in Cowpea genotype Kashi Nidhi (50.20) cm followed by in cowpea genotypes IET2023/COPBVAR-6 (42.00cm). The minimum plant height (32.00) in Cowpea genotypes IET2023/COPBVAR-3.

At 60 DAS maximum plant height was observed in Cowpea genotype IET2023/COPBVAR-4(57.06cm), followed by in cowpea genotypes IET2023/COPBVAR-6 (57.00cm). The minimum plant height (50.10cm) in Cowpea genotype Kashi nidhi. Similar results were reported by Nigude *et al.*, (2004)^[11] in cowpea and Sawardekar (2007)^[12] in yard long bean. Also Kumar *et al.*, (2017)^[9, 10].

Table 1: Plant height of various cowpea genotypes

| Notations | Genotypes | Plant height (cm) | | |
|-----------------|-------------------|-------------------|---------|---------|
| | | 20 Days | 40 Days | 60 Days |
| G ₁ | IET2023/COPBVAR-1 | 16.00 | 37.00 | 55.02 |
| G ₂ | IET2023/COPBVAR-2 | 17.00 | 33.00 | 54.20 |
| G ₃ | IET2023/COPBVAR-3 | 17.00 | 32.00 | 56.30 |
| G ₄ | IET2023/COPBVAR-4 | 18.00 | 33.00 | 57.06 |
| G ₅ | IET2023/COPBVAR-5 | 21.00 | 33.50 | 49.70 |
| G ₆ | IET2023/COPBVAR-6 | 22.21 | 42.00 | 57.00 |
| G ₇ | IET2023/COPBVAR-7 | 20.00 | 37.50 | 52.22 |
| G ₈ | KASHI NIDHI | 19.00 | 50.20 | 50.10 |
| G ₉ | KASHI GAURI | 18.00 | 36.21 | 54.02 |
| G ₁₀ | C.P.6 | 17.00 | 32.21 | 55.20 |
| | F- test | S | S | S |
| | SE(d) | 0.00 | 2.31 | 0.97 |
| | C. D. (P = 0.05) | 0.00 | 4.86 | 2.04 |
| | C.V. | 0.01% | 7.79% | 2.18% |

Days of first flowering in various cowpea genotypes

The minimum number of Days of first flowering was observed in Kashi Gouri (32.00days), followed by C.P.6 with (35.00days) and whereas maximum was (56.6) recorded in IET2023/COPBVAR-2. Similar The genotypes of Kashi Gouri 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 Sharma P *et al.*, (2019)^[13].

Days of 50% of flowering in various cowpea genotypes.

The minimum number of Days of first 50% flowering was recorded in Kashi Gouri (36.00 days), followed by C.P.6 with and (39.00 days) and whereas maximum was (46.00) recorded in

IET2023/COPBVAR-6.

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 Sharma P *et al.*, (2019)^[13].

Flower Colour in various cowpea genotypes.

The flower colour recorded as green colour was found IET 2023 / COPBVAR -1, IET 2023 / COPBVAR-2 IET 2023/COPBVAR-5, IET2023/COPBVAR-7, kashi gauri and C.P.6. Light color is found in IET2023/COPBVAR-3, IET2023/COPBVAR-4, IET2023/COPBVAR-6 and Kashi Nidhi.

Table 2: Days to first flowering, 50% flowering, flower colour and pod colour of various cowpea genotypes

| Notations | Genotypes | Days of first flowering | 50% of flowering days | Pod color |
|-----------------|-------------------|-------------------------|-----------------------|-------------|
| G ₁ | IET2023/COPBVAR-1 | 41.00 | 44.00 | Green |
| G ₂ | IET2023/COPBVAR-2 | 42.00 | 46.00 | Green |
| G ₃ | IET2023/COPBVAR-3 | 41.25 | 44.00 | Light Green |
| G ₄ | IET2023/COPBVAR-4 | 35.00 | 40.00 | Light Green |
| G ₅ | IET2023/COPBVAR-5 | 36.00 | 41.00 | Green |
| G ₆ | IET2023/COPBVAR-6 | 41.00 | 46.00 | Light Green |
| G ₇ | IET2023/COPBVAR-7 | 38.50 | 42.00 | Green |
| G ₈ | KASHI NIDHI | 35.80 | 40.00 | Light Green |
| G ₉ | KASHI GAURI | 32.00 | 36.00 | Green |
| G ₁₀ | C.P.6 | 35.00 | 39.00 | Green |
| | F- test | S | S | |
| | SE(d) | 0.35 | 0.03 | |
| | C. D. (P = 0.05) | 0.73 | 0.06 | |
| | C.V. | 1.12% | 0.09% | |

Pod Yield per plant (g) in various cowpea genotypes

The data pertaining to the mean plant height as influenced by different treatment was recorded periodically during the crop growth stages. The first picking pod Yield per plant (g) in plant of cowpea maximum number of first picking Yield (g) was recorded in Cowpea genotype IET2023/COPBVAR-6 (277.33), followed by Cowpea KASHI GAURI (218.27), and minimum

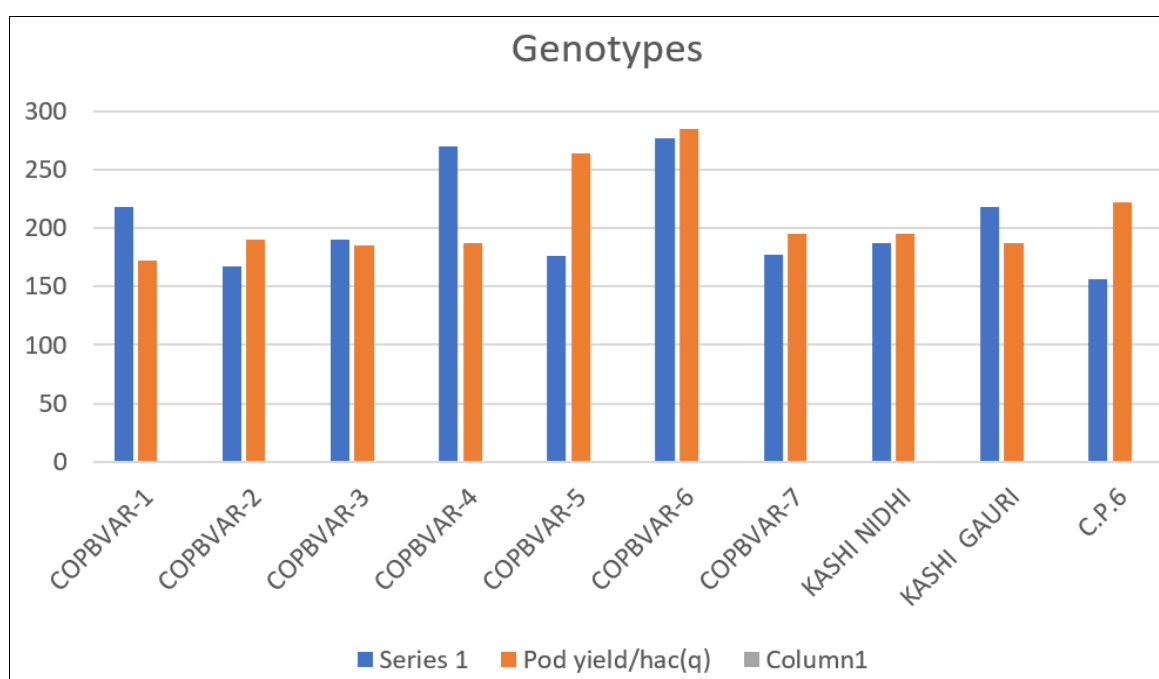
was (156.67) recorded in C.P.6.

Green Pod yield (Q/ha) in various cowpea genotypes

The Pod Yield (q/ha) in plant of cowpea maximum was recorded in IET2023/COPBVAR-6 (285.00), followed by IET2023/COPBVAR-5(264.00) and minimum was (5.98) recorded in IET2023/COPBVAR-1.

Table 3: Pod Yield per plant (g) and green pod yield (q/ha) of various cowpea genotypes.

| Notations | Genotypes | Pod Yield/ plant(g) | Pod Yield/hect(q) |
|-----------------|-------------------|---------------------|-------------------|
| G ₁ | IET2023/COPBVAR-1 | 218.13 | 172.00 |
| G ₂ | IET2023/COPBVAR-2 | 166.81 | 190.00 |
| G ₃ | IET2023/COPBVAR-3 | 189.81 | 185.00 |
| G ₄ | IET2023/COPBVAR-4 | 269.47 | 187.00 |
| G ₅ | IET2023/COPBVAR-5 | 176 | 264.00 |
| G ₆ | IET2023/COPBVAR-6 | 277.33 | 285.00 |
| G ₇ | IET2023/COPBVAR-7 | 177.27 | 195.20 |
| G ₈ | KASHI NIDHI | 187.27 | 195.00 |
| G ₉ | KASHI GAURI | 218.27 | 187.00 |
| G ₁₀ | C.P.6 | 156.67 | 222.00 |
| | F- test | S | S |
| | SE(d) | 10.96 | 7.43 |
| | C. D. (P = 0.05) | 22.638% | 15.60% |
| | CV | 111.66 | 4.42 |

**Fig 3:** Pod Yield per plant (g) and green pod yield (q/ha) of various cowpea genotypes

Conclusion

Yields of genotypes largely depend on constant water supply with adequate environmental and soil factors to have relatively stable yields in different agro-ecological zones. In experimental site all the characters viz., growth parameters, flowering behaviour, yield and yield attributing characters, varied significantly. Further, while studying the flowering behavior, Cowpea genotypes IET2023/COPBVAR-2 found to be the earliest. The Cowpea genotypes IET2023/COPBVAR-6 (G₆) had noticed more yields per plant and per ha. and on basis of growth characters, flowering behaviour, yield and yield attributing characters, because IET2023/COPBVAR-6 (G₆) varieties have high genetic purity, it is free from disease and pest resistant, resistant from abiotic and biotic factor, it not affected by adverse condition of environment and easily absorb nutrient.

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