

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

#### **Abstract**

The experiment on **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 2022 in order to standardize the best genotype of Cowpea. Among the all genotype VNRCP-27 (G<sub>1</sub>) found to be the earliest. The Cowpea genotypes Sheetal (G<sub>10</sub>) had noticed more yield 556gram per plant and 17.91 tonnes per hac. under Prayagraj agro climatic conditions. The above genotype also recorded desirable values for pod parameters like length of pod 86.53 cm, weight of pod 23.07 gram, which parameters deciding a better market acceptability. Thus, on the basis of growth characters, flowering behavior, yield characters, pod parameters cowpea genotype Kashi Gouri (G<sub>15</sub>) and cowpea genotypes Sheetal (G<sub>10</sub>) were found to be promising. While cowpea genotype VNRCP-27 (G<sub>1</sub>) found to be the highest T.S.S 5.90 among all genotypes. The highest profit and maximum benefit cost ratio 2.53 was observed in cowpea genotypes Sheetal (G<sub>10</sub>).

#### **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 (**Vavilov, 1951**). 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.

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.

Cowpea is a native to Central Africa and belongs to the family Leguminaceae with subfamily Papilionaceae. The common names are “Black-eye-pea” “Southern pea” “China pea” “Marble pea”. Cowpea is an annual herbaceous plant with large tap root system and alternate trifoliolate leaves with ovate leaflets. It can either be short and bushy or act like a vine by climbing supports or trailing along the ground. Generally colors of cowpea flowers are purple, pink, yellow, white and blue. A pod can contain 6-13 seeds that are usually kidney shaped although the seed become more spherical and more restricted within the pod. It is eaten in the form of grain, green pods and leaves. Like other legumes, cowpea grains is cooked to make it edible, usually by boiling but the most important way to eat them is in curries. The roots are eaten in Sudan and Ethiopia. Peduncles and stems are used as fibers in Nigeria. Cowpea is known as „vegetable meat“ or „Poor man“s meat“ due to high amount of protein in the green leaves with better biological value on dry weight basis. The grain contains 24.8 per cent protein, 1.9 per cent fat, 63.6 per cent carbohydrates, 6.3 per cent fiber, 0.00074 per cent thiamine, 0.00042 per cent Riboflavin, 0.00281 per cent Niacin.

Among different vegetables, leguminous crops play an important role as it is the only source of vegetable protein which is required for human health. They also provide minerals, vitamins and fibers. It constitutes about 10-12% of the Indian diet According to WHO recommendation, the intake of leguminous should be 80g/day/capita. Similarly, leguminous vegetables are fewer probes to climatic changes and helps in maintaining soil health and thus, are important contributors of profitable cropping system is popularly followed by vegetables

wherever irrigation is available after withdrawals of rain.

When dried, tender pods and green shelled seeds are consumed as a vegetable and a pulse. 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. 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. 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.

## **Materials and Methods**

The materials used and methods adopted in the present experiment **Evaluation of performance of cowpea (*Vigna unguiculata* L.) genotypes for growth, yield & quality under Prayagraj agro-climatic condition.** The experiment was conducted during the *Kharif season of 2022* at the Departmental field of Horticulture, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj. The experiment was laid out in Randomized Block Design RBD with 17 different cowpea genotypes was used in the experiment which was performed using various sources. Observations will be recorded like growth Parameters; days of germination of first seedling, plant habit, plant height (cm) 20-40-60 DAS, number of nodes per plant on main stem, reproductive parameters; days taken to first flowering, number of cluster per plant, Days of first and 50% flowering, yield i.e. pod length, pod weight and quality parameter like T.S.S were recorded in main field level as well as in laboratory.

## **Result and Discussion**

### **1. Growth Parameter**

#### **1.1 Days of 1<sup>st</sup> germination in various cowpea genotypes.**

The maximum day of germination (5.80 days) was observed in cowpea genotypes Kashi Kanchan and followed with cowpea genotypes Kashi Gouri (5.00 days). The minimum days of

germination (3.80 days) was observed in cowpea genotypes with followed in cowpea genotypes VNRCCR-27.

### **1.2 Plant Growth Habit in various cowpea genotypes.**

Plant growth habit were recorded according to bushy or pole type growth nature. VNRcp-27, Jaripa, C.G.01, C.G.02, C.G.03, C.G.04, C.G.05, Super ujjwal., Ujala, Sheetal, Ujjawal, Danmantri are the pole type and all other like Kashi nindi, Kashika-6, Kashi kohinor, Kashi gouri, Kashi Kanchan is genotypes.

### **1.3 Plant height in various cowpea genotypes.**

At 60 DAS maximum plant height was observed in Cowpea genotype Sheetal (304.40), followed by in was cowpea genotypes VNRCP-27 (284.07cm). The minimum was (68.73) in Cowpea genotype Kashi Kanchan.

### **1.4 Number of nodes / plant on main stem in various cowpea genotypes**

At 60 DAS maximum Number of nodes per plant on main stem was observed in Cowpea genotype Kashi Gouri (22.33) and with followed in cowpea genotypes Kashi Nindi (22). The minimum was (13.27) in Cowpea genotype Ujala.

### **1.5 No. of root nodules per plant in various cowpea genotypes.**

The number of Root nodules per plant of cowpea maximum number of Root nodules per plant was recorded in Cowpea genotype Kashi kanchan (48.67), followed by Cowpea genotype Sheetal (44.00), Cowpea genotype VNRCP-27 (11.00) and minimum was (56.67) in Cowpea genotype G5.

## **2. Reproductive Parameters**

### **2.1 Days of 50 % of flowering in various cowpea genotypes**

The minimum number of Days of first 50% flowering was recorded in Kashi Gouri (36.87 days), followed by Sheetal with and (37.67days) and whereas maximum was (63.47) recorded in C.G.03. The genotypes of Kashi Gouri given minimum days to 50% flowering observed due to favourable Prayagraj Agro-climatic condition.

### **2.2 Number of cluster /plant in various cowpea genotypes**

Maximum Number of cluster /plant was recorded in Kashi Gouri (5.40), followed by Sheetal (4.87) and minimum was (2.53) recorded in C.G.03. Thus more accumulation of photosynthates and their translocation from source to sink in reproductive crop growth phase which resulted in improvement of all yield attribute.

### **2.3 Number of Pod/cluster in various cowpea genotypes**

Maximum Number of Pod /cluster was recorded in Kashi Gouri (11.47), followed by sheetal with (10.13) and minimum was (3.73) recorded in C.G.03

## **3. Yield Parameter**

### **3.1 Pod length (cm) in various cowpea genotypes.**

The pod per length (cm) of cowpea the maximum pod length (cm) recorded in Sheetal (86.53cm), followed by C.G.05 with (39.53) and minimum was (18.33) recorded in C.G.01.

### **3.2 Single pod weight (g) in various cowpea genotypes**

The maximum 10 pod weight per plant (g) recorded in Sheetal (196.17), follows by C.G.05 with (150.g) and minimum was (65.75g) recorded in Kashi Kanchan.

### **3.3 Number of Seeds/pod in various cowpea genotypes**

The maximum number of seeds/pods was recorded in Sheetal (18.53), followed by C.G.05 with (17.33) and minimum was (10.93) recorded in C.G.01.

### **3.4 Pod yield (Q/ha) in various cowpea genotypes**

The Pod Yield (t/ha) in plant of cowpea maximum was recorded in Sheetal (17.91), followed by Kashi Gouri with (16.8) and minimum was (5.98) recorded in C.G.O3.

## **4. Quality characters**

### **4.1 T.S.S**

The maximum T.S.S. of cowpea was recorded in VNRCP-27 is better favourable climatic condition and adaptability of genotype under prayagraj Agro-climatic condition.

**Table 1 : Evaluation of different genotypes of cowpea (*Vigna unguiculata* L.) on pre harvest observations.**

Notation	Genotype	Days of 1 <sup>st</sup> germination	Plant height (cm)	Number of Nodules /plant	No. of Root nodules per plant
G <sub>1</sub>	VNRCP-27	3.8	284.07	19.6	11
G <sub>2</sub>	Jaripa	5.2	268.33	19.93	21.67
G <sub>3</sub>	C.G.01	5.33	211.67	16.93	19.67
G <sub>4</sub>	C.G. 02	4.33	274.53	14.33	12.33
G <sub>5</sub>	C.G. 03	4.47	283.87	20.27	3
G <sub>6</sub>	C.G. 04	4.93	223.53	19.27	20
G <sub>7</sub>	C.G. 05	4.2	274.07	17.27	18.67
G <sub>8</sub>	Super Ujjwal	4.33	265.13	21.73	14.33
G <sub>9</sub>	Ujala	5.53	268.33	13.27	29.67
G <sub>10</sub>	Sheetal	4.33	304.4	18.6	44
G <sub>11</sub>	Ujjawal	4.2	277.73	17.33	13.67
G <sub>12</sub>	Kashi Nindi	5.47	112	22	17.33
G <sub>13</sub>	Kashika-6	4.87	137.07	16.27	20
G <sub>14</sub>	Kashi Kohinor	5.57	111.8	16.47	34.33
G <sub>15</sub>	Kashi Gouri	5	92.27	22.33	39.67
G <sub>16</sub>	Kashi kanchan	5.8	68.73	14.47	48.67
G <sub>17</sub>	Danmantri	4.27	270.4	18.87	19
<b>F- test</b>		<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>SE(m)</b>		0.378	3.392	0.417	2.16
<b>C. D. (P = 0.05)</b>		0.78	7	0.86	4.45
<b>C.V.</b>		3.85	34.56	<b>4.25</b>	21.99

**Table 2: Evaluation of different genotypes of cowpea (*Vigna unguiculata* L.) on reproductive parameter.**

Notation	Genotype	Days of first flowering	50 % of flowering days	Number of cluster /plant	Number of Pod /cluster	Days to first picking
G <sub>1</sub>	VNRCP-27	34	38.73	3.27	8.27	44.87
G <sub>2</sub>	Jaripa	37	40.67	4.07	7.47	45.2
G <sub>3</sub>	C.G.01	48.33	58.93	2.53	4.67	71
G <sub>4</sub>	C.G. 02	56.33	62.07	3.2	5.07	69.93
G <sub>5</sub>	C.G. 03	56.67	63.47	2.53	3.73	48.13
G <sub>6</sub>	C.G. 04	53	58.93	2.6	4	67.13
G <sub>7</sub>	C.G. 05	46	55.47	2.73	4.67	61.73
G <sub>8</sub>	Super Ujjwal	38	59.73	4.13	6.53	46.8
G <sub>9</sub>	Ujala	34	38.27	4.73	9.73	68.6
G <sub>10</sub>	Sheetal	33.67	37.67	4.87	10.13	44.93
G <sub>11</sub>	Ujjawal	35	40.27	3.93	7.87	48.47
G <sub>12</sub>	Kashi Nindi	35	39.13	4.6	9.47	45.2
G <sub>13</sub>	Kashika-6	37	40.53	3.8	7.6	48.13
G <sub>14</sub>	Kashi Kohinor	35.67	40.07	3.8	7.33	47.93
G <sub>15</sub>	Kashi Gouri	33	36.87	5.4	11.47	44.6
G <sub>16</sub>	Kashi kanchan	37	40.6	4.87	9.87	48.53
G <sub>17</sub>	Danmantri	43.33	43	4.33	8.67	47.67
<b>F- test</b>		S	S	S	S	S
<b>SE(m)</b>		2.22	4.79	0.21	0.58	0.56
<b>C. D. (P = 0.05)</b>		4.59	9.9	0.44	1.2	1.17
<b>C.V.</b>		22.64	48.85	2.18	5.94	5.75

**Table 3: Evaluation of different genotypes of cowpea (*Vigna unguiculata* L.) on Yield Parameter.**

Notation	Genotype	Pod length (cm)	Single pod weight (g)	Days of pod maturity in plant	No. of seed per pod	Pod yield per plant (g)	T.S.S
G <sub>1</sub>	VNRCP-27	32.11	10.37	53.67	17.8	218.13	5.9
G <sub>2</sub>	Jaripa	38.87	14.53	53.13	15	277.33	5.2
G <sub>3</sub>	C.G.01	18.33	10.97	82.67	10.93	166.8	4.9
G <sub>4</sub>	C.G. 02	23.67	8.23	78.33	13.73	189.87	4.8
G <sub>5</sub>	C.G. 03	27.72	12.4	79.6	11.47	156.67	4.1
G <sub>6</sub>	C.G. 04	32.17	10.43	79.27	15.8	176	5.1
G <sub>7</sub>	C.G. 05	39.53	16.49	72.53	17.33	177.27	4.8
G <sub>8</sub>	Super Ujjwal	29.93	9.93	58.07	14.8	187.27	4.9
G <sub>9</sub>	Ujala	31.21	12.47	54.13	16.6	218.27	5.3
G <sub>10</sub>	Sheetal	86.53	23.07	53	18.53	556	4.2
G <sub>11</sub>	Ujjawal	29.77	11.03	58.07	15.6	204.73	4.7
G <sub>12</sub>	Kashi Nindi	32.5	12.43	53.93	15.2	269.47	5.3
G <sub>13</sub>	Kashika-6	30.63	11.4	55.73	16.07	244.27	4.8
G <sub>14</sub>	Kashi Kohinor	30	11.53	56.73	15.27	234.27	5.4
G <sub>15</sub>	Kashi Gouri	22.87	8.5	52.8	12	339.47	4.9
G <sub>16</sub>	Kashi kanchan	29.23	7.93	58.53	12.93	324.73	5.4
G <sub>17</sub>	Danmantri	22.87	14.77	56.8	16.07	272.53	4.9
<b>F- test</b>		<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>SE(m)</b>		7.204	1.45	1.46	0.2	10.968	0.01
<b>C. D. (P = 0.05)</b>		14.868	2.99	3.02	0.41	22.638	0.03
<b>C.V.</b>		73.4	14.79	14.91	2.03	111.75	0.14

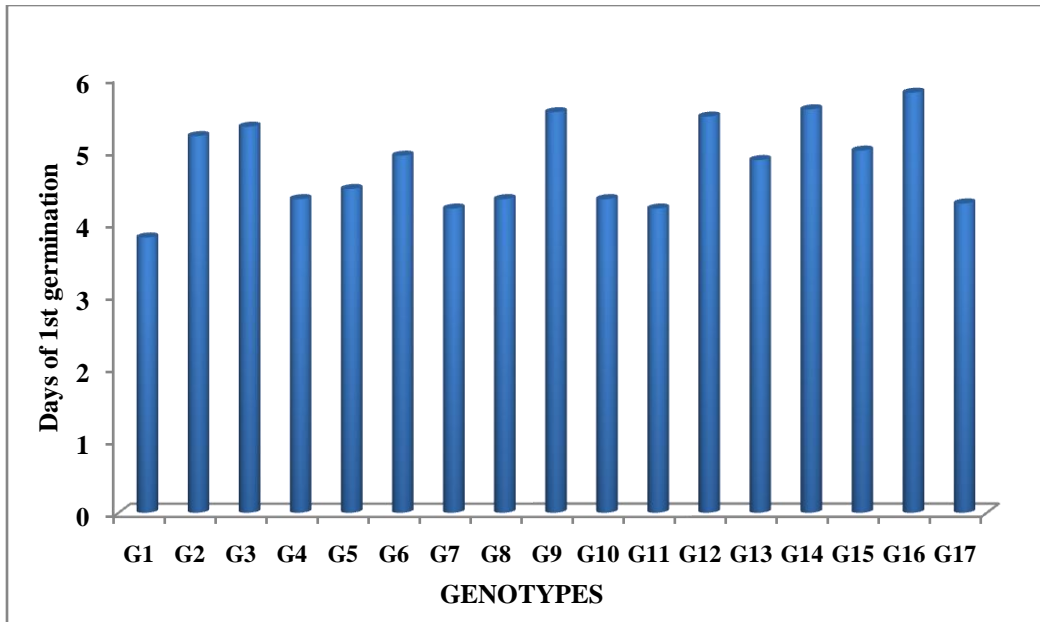


Fig.No 1. Days to germination of various cowpea genotypes

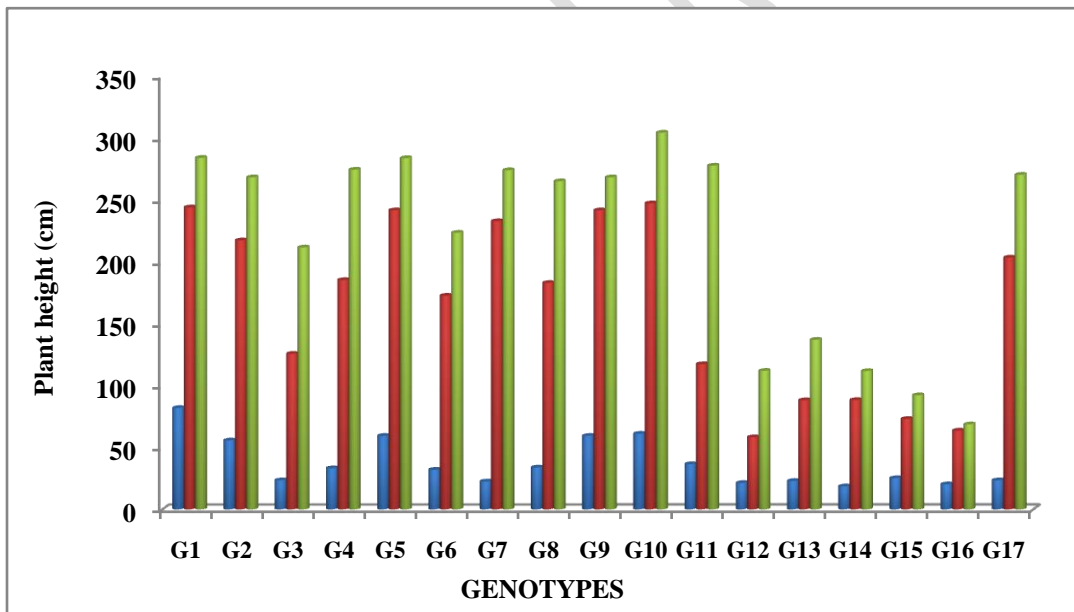
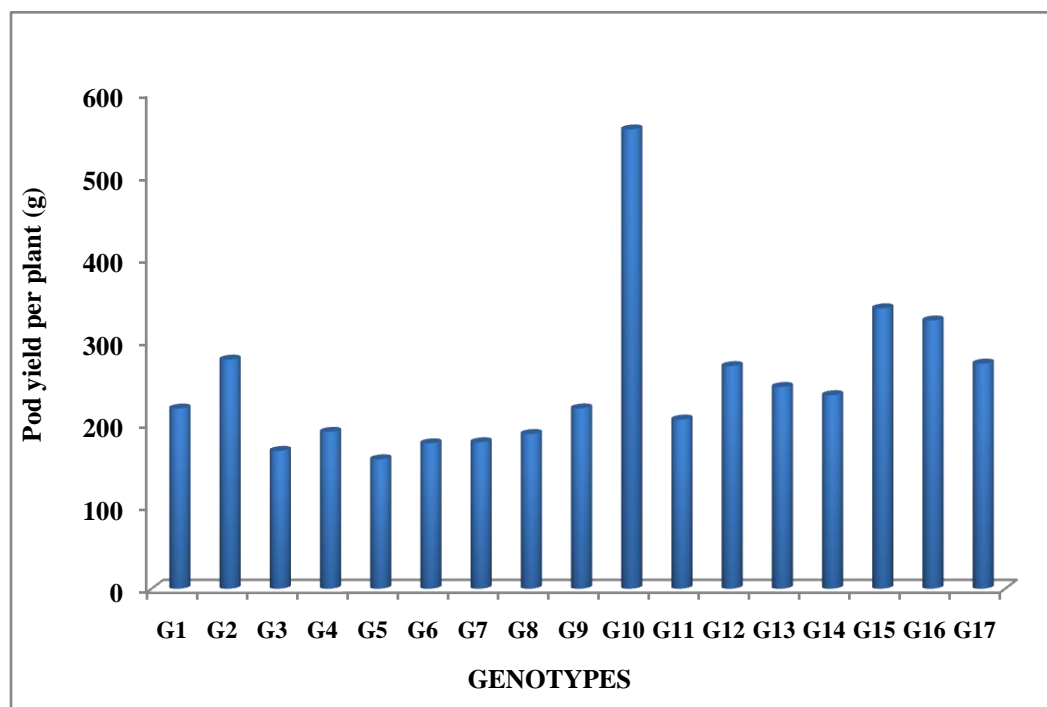


Fig.No 2. Plant height at 20, 40, 60, days of various cowpea genotypes



**Fig.No 3. Yield of various cowpea genotypes**

## CONCLUSION

From the above experiment finding it was concluded that, all the characters viz., growth parameters, flowering behaviour, yield and yield attributing characters, pod parameters varied significantly. Further, while studying the flowering behavior, Cowpea genotypes VNRCP-27 ( $G_1$ ) found to be the earliest. The Cowpea genotypes Sheetal ( $G_{10}$ ) had noticed more yields per plant and per ha. under Allahabad agro climatic conditions. These variety also recorded desirable values for pod parameters like length of pod, weight of pod, 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 Cowpea genotypes Kashi Gouri ( $G_{15}$ ) and Cowpea genotypes Sheetal ( $G_{10}$ ) were found to be promising. However, it needs confirmation by conducting same investigation for next 2-3 seasons. From the above experimental finding, it was concluded that the highest profit and maximum benefit cost ratio was observed in cowpea genotypes Sheetal ( $G_{10}$ ).

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