

EVALUATION OF DIFFERENT VARIETIES OF COWPEA FOR QUALITY SEED PRODUCTION IN HARYANA

MAKHAN MAJOKA*, V. P. S. PANGHAL AND AXAY BHUKER¹

Department of Vegetable Science,

¹Department of Seed Science & Technology

CCS Haryana Agricultural University, Hisar-125 004 (Haryana), India

*(e-mail : makhanmajoka@gmail.com)

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SUMMARY

The present experiment was conducted at Seed Research Area, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar (Haryana) in rainy season during 2017 and 2018 for two years. The objective of the investigation was to identify different varieties of cowpea for quality seed production in Haryana. There were total six varieties of cowpea as a treatments viz., P-263, Kashi Kanchan, Pusa Komal, Pusa Sukomal, Charodi-1 and HC-46 that were laid out in Randomized Block Design with three replications. Among six varieties of cowpea, seed contributing attributes viz. days to early flowering (40.60 days), maximum number of pod/plant (24.08), number of seed/pod (14.03), seed yield/plant (15.98 g) and seed yield/ha (13.99 q) were recorded significantly higher in Kashi Kanchan variety which was statistically at par with P-263 and Pusa Sukomal. However, hundred seed weight was recorded maximum in P-263 (9.75 g), which was at par with Kashi Kanchan and Pusa Sukomal varieties of cowpea.

Key words : Cowpea, varieties, evaluation, seed production

Vegetable farming is the most intensive, profitable and most remunerative business. It is also gaining popularity among the farmers having small land holdings. Pulses occupy an essential place in our daily diet as a source of protein. Pulse crops also have the unique ability to associate symbiotically with *Rhizobium spp.* and fix atmospheric nitrogen and enriching the soil (Arya *et al.*, 2019). The cowpea (*Vigna unguiculata*) is a warm/rainy season, annual herbaceous legume from the genus *Vigna* and family Leguminosae (Vu *et al.*, 2017; Nguyen *et al.*, 2019). It is also known as Black-eye bean, Southern pea and *Lobia*. It has multiple uses like food, feed, forage, fodder, green-manuring and vegetables (Nguyen *et al.*, 2016). This is also known as vegetable-meat, is one of the most ancient crops known to man.

Cowpea crop is primarily grown for grains (pulse). The seeds are usually harvested and dried for storage and consumed later, either after complete cooking or milled like a flour product and used in various recipes (Nielson *et al.*, 1997). All the parts of the plant used as food are nutritious providing (20-24%) protein, (63.3%) carbohydrates and (1.9%) fat in cowpea seeds (Gopalan *et al.*, 2007). Cowpea seed provide a rich source of proteins and calories, as well as minerals and vitamins. A seed cowpea consists of protein and has

very low fat content and cholesterol, its starch is digested more slowly than the starch from cereals, which is more beneficial to human health. The grain of cowpea is a rich source of folic acid and important vitamins. It could be thrives well in warm weather due to its drought-tolerant capacity. It is tolerant to drought as well as rain water stagnation conditions (Panchta *et al.*, 2021).

Cowpea cultivars with different plant morphology would require different optimum environmental conditions to express their full seed yield potential (Ndiaga, 2000). Different cultivars respond differently to temperature and day length and thus there are distinct cultivars for spring-summer and rainy seasons (Chakraborty, 1997). The success of most crop improvement programme largely depends upon the genetic variability and the heritability of desirable traits in reproductive period and grain yield of cowpea under high temperature condition and the duration of reproductive period (Singh, 1997). Varietals differences of cowpea in terms of growth pattern, seed maturity date is extremely diverse from plant to plant, making breeding programs for cowpea more complex than other crops. Keeping the above facts in mind the present experiment was planned with the objective to identify of different varieties of cowpea for quality seed production in Haryana.

MATERIALS AND METHODS

The present experiment was conducted at Seed Research Area, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar (Haryana) in rainy season during 2017 and 2018 for two years. Hisar is located at latitude of 29° 10' North, longitude of 75°46' East and at an altitude of 215.2 meters above mean sea level on South Western border of the Rajasthan state and at a distance of about 175 km in West of the National capital city, New Delhi. This area is characterized by semi-arid climate along with hot and dry winds during summer and dry severe cold in winters which are common features of this region. The mean temperature in this region exhibit wide range from 44°C to 48°C during summer and as low as up to freezing point accompanied with chill frost in winter months. Maximum rainfall in this area is received during the months of July to September with showers in the month of January to late spring. The meteorological data on various parameters as observed during the period of experimentation collected from the Department of Agricultural Meteorology are presented in the following Fig. 1 & 2.

There were total six varieties *viz.*, P-263, Kashi Kanchan, Pusa Komal, Pusa Sukomal, Charodi-1 and HC-46 which were laid out in Randomized Block Design with three replications. Pure and healthy seed of the superior varieties of cowpea were collected from different parts of the country developed by reputed Research Institutes and evaluated with keeping view of hunt the variety with unique features useful for the seed yield and quality attributes and which would go a long way to help the vegetable crop industry and subsequently improve the nutritional status and economy. The net size of each plot was kept 3.6 m×3.6 m. Farmyard manure was incorporated @ 10 t/ha in the soil before field preparation. The experimental field was prepared by 2-3 ploughing followed by planking to prepare suitable field. 40 kg phosphorus and 25 kg nitrogen per hectare was applied at the time of sowing in cowpea field according to package of practices. Sowing was done on first week of July for both the year. The pure and healthy seed was sown 3-4 cm deep in the row with the help of hand drawn rack at spacing of 45x20 cm in rainy season. Ten days after sowing, thinning and gap filling operations were also performed. Irrigation was applied as and when the crop required. First hoeing was given 25 days after sowing and one more hoeing was given at 45 days after sowing to control the weeds. A pre-

emergence weedicide Stomp30 EC (Pendimethalin) @ 2.5 l/ha was also applied to suppress the weed. The recommended plant protection measures were adopted as and when required for raising a healthy seed crop.

Field inspections were made when the plants are in full flower and a second when pods are sufficiently developed to specify varietal purity. Pods were harvested when they were fully mature, turn brown color and then placed these harvested pods in pakka floor for further drying and then threshing by beating pods. The recorded data on different parameters was analyzed statistically using OPSTAT software developed by Chaudhary Charan Singh Haryana Agricultural University, Hisar to find out the significance of variation resulting from the experimental treatments. All the tests of significance were made at 5% level of the significance. In order to compare the means of different treatments, the critical difference (C.D.) was calculated by using the below mentioned formula:

$$C.D. = S.E. (d) \times "t" \text{ at } 5\% \text{ for error degree of freedom}$$

Where,

S.E. (d) = Standard error (SE) of difference of two treatment means

t = t distribution tabulated value for error degree of freedom at 5% significance

RESULTS AND DISCUSSION

Evaluation of different varieties of cowpea for seed contributing attributes

The data presented in Table 1 revealed that Kashi Kanchan significantly performed early flower emergence (40.60 days) which was found statistically at par with P-263 (40.95 days) among the six varieties of cowpea. However, Charodi-1 performed delay flowering (50.20 days) among six varieties variety of cowpea. Early flowering in cowpea is also a desirable character for earliness. Maximum number of pod per plant (24.08) and number of seed per pod (14.03) were recorded in variety Kashi Kanchan which was found statistically at par with variety P-263 (23.45) and (13.72) and Pusa Sukomal (21.62) and (12.83), respectively. However, minimum number of pod per plant (14.67) was noticed in Pusa Komal and minimum number of seed per pod (7.98) was recorded in HC-46 variety of cowpea (Table 1).

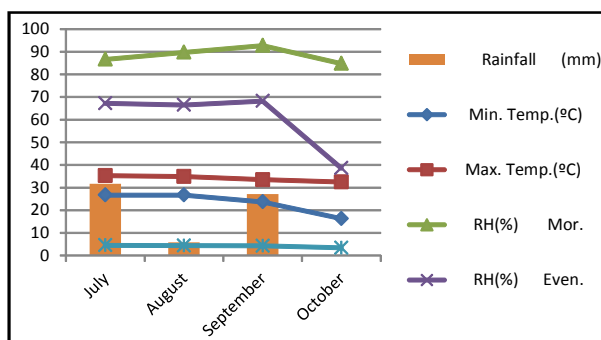
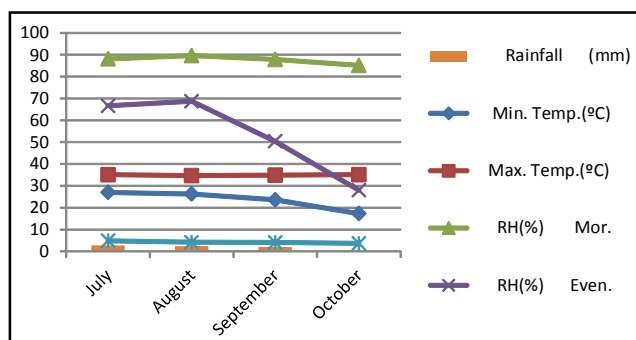


Fig. 1. Mean monthly meteorological data for rainy season 2017. Fig. 2. Mean monthly meteorological data for rainy season 2018.

TABLE 1
Evaluation of different varieties of cowpea for seed contributing attributes

Treatments (Varieties)	Days to flower emergence			Number of pod/plant			Number of seed/pod		
	2017-18	2018-19	Mean	2017-18	2018-19	Mean	2017-18	2018-19	Mean
P-263	40.00	41.90	40.95	22.43	24.47	23.45	13.33	14.10	13.72
Kashi Kanchan	40.00	41.20	40.60	23.15	25.00	24.08	13.70	14.35	14.03
Pusa Komal	45.50	46.40	45.95	14.00	15.33	14.67	9.09	9.70	9.40
Pusa Sukomal	42.10	43.20	42.65	20.46	22.77	21.62	12.60	13.05	12.83
Charodi-1	48.60	51.80	50.20	18.84	20.70	19.77	8.16	8.10	8.13
HC-46	48.00	48.60	48.30	16.75	18.00	17.38	8.00	7.95	7.98
CD at 5%	0.80	1.40	1.10	2.53	2.46	2.50	1.16	1.90	1.53

Variation in these seed contributing attributes might be due to response of different varieties to different agro-climatic condition and also the genetic makeup of the varieties. Cowpea cultivars with different plant morphology would require different optimum environmental conditions to express their full seed yield potential (Ndiaga, 2000). Pandey & Singh (2011) also reported the significant variation in number of pods per plant among the different varieties of cowpea. Amanullah & Hatam Ahmad (2000) found that there is a positive relation between the number of seed per plant and the individual pod weight that directly influenced the yield of the variety.

Evaluation of different varieties of cowpea for seed yield and test weight

The data presented in Table 2 reveals that seed yield characters such as seed yield per plant (15.98 g) and seed yield per hectare (13.99 q) were found significantly higher in variety Kashi Kanchan during both the years, while the performance of the variety P-263 such as seed yield per plant (14.12 g) and seed yield per hectare (12.60 q) and Pusa Sukomal seed yield per plant (13.74 g) and seed yield per hectare (11.62 q) was found statistically at par both the year.

These both parameters *viz.* seed yield per plant (6.55 g) and seed yield per hectare (4.64 q/ha) were recorded minimum in Charodi-1 variety of cowpea.

Difference in these attributes may be due to its inherent genetic set up, suitability of climate, atmospheric conditions and soil conditions of this region. Patel and Kumari (2018) in Gujarat found this variety (Kashi Kanchan) at par with the best performing variety of the experiment. This might also be due to the higher number of pods per plant and number of seed per pod. Neema *et al.* (1991), Rajput *et al.* (1991) and Pandey & Singh (2011) also observed similar finding and variation in yield of the different varieties. However, hundred seed weight was recorded maximum in variety P-263 (9.75 g), which was at par with Kashi Kanchan (9.44 g) and Pusa Sukomal (9.23 g) varieties of cowpea.

CONCLUSION

Based on the two years study, it may be concluded that seed yield and seed yield contributing attributes were recorded significantly higher in Kashi Kanchan variety, which was statistically at par with P-263 and Pusa Sukomal varieties of cowpea at Haryana Condition.

TABLE 2
Evaluation of different varieties of cowpea for seed yield and test weight

Treatments (Varieties)	Seed yield/plant (g)			Seed yield (q/ha)			Test weight (g) (100 seed weight)		
	2017-18	2018-19	Mean	2017-18	2018-19	Mean	2017-18	2018-19	Mean
P-263	13.04	15.20	14.12	11.43	13.77	12.60	9.66	9.83	9.75
Kashi Kanchan	15.05	16.90	15.98	13.04	14.93	13.99	9.23	9.65	9.44
Pusa Komal	7.50	9.63	8.57	6.20	8.05	7.13	7.30	7.93	7.62
Pusa Sukomal	12.80	14.68	13.74	10.54	12.70	11.62	9.13	9.32	9.23
Charodi-1	6.19	6.90	6.55	4.36	4.91	4.64	5.02	5.30	5.16
HC-46	6.73	7.00	6.87	4.75	5.16	4.96	5.19	5.50	5.35
CD at 5%	2.31	2.40	2.36	2.60	2.56	2.58	1.07	1.23	1.15

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