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COWPEA VARIETIES EVALUATION OF FOR GROWTH AND YIELD UNDER HARYANA CONDITIONS

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SUMMARY

Production of cowpea in India is limit by lack of improved varieties and seeds. Majority of varieties released were not characterize for adaptation in other parts of the country and as such their usefulness for deployment in breeding programs as well as considered for re-lease to farmers cannot be ascertained. For effectively determine the usefulness of any introduced varieties, accessions, evalua-tion of that is necessary in particular climatic condition. The present experiment was conducted at CCS Haryana Agricultural University, Hisar in rainy season during 2017-18 and 2018-19 for two years. The objective of the investigation was to identify the performance of different varieties of cowpea for quality pod yield in climatic conditions of Haryana. There were total five varieties *viz*., P-263, Kashi Kanchan, Pusa Komal, Pusa Sukomal and Charodi-1 that were laid out in Randomized Block Design with four replications. The result revealed that number of branches per plant, number of pods per plant, pod length and pod yield was recorded significantly higher in Kashi Kanchan followed by P-263 varieties of cowpea. Hence, for pod production in climatic conditions of Haryana, cowpea varieties Kashi Kanchan and P-263 were recommended.

Key words : Cowpea, lobia, pod yield, contributing traits

Cowpea is green fodder as well as nutritive vegetable. It is also known as lobia, black-eye pea and southern pea. Due to high protein content, resistance to drought, adaptability of different soil types, this pulse crop getting more economic important all over the country (Panchta *et al.,* 2021). It is mostly grown for their edible green pods and seeds. Moreover, its stem and leaves used as animal feed during the dry therefore, its sale also provide additional income to the farmers. It is also used as a green manure crop, a nitrogen-fixing crop or for increasing organic matter and improving soil structure. It has excellent heat tolerance and food drought tolerance (Patel *et al*., 2018; Majoka *et al.,* 2021)).

Cowpea cultivars with different plant morphology would require different optimum environmental conditions to express their full yield potential (Ndiaga, 2000). The success of most crop improvement programmed largely depends upon the genetic variability and the heritability of desirable traits in reproductive period and pod 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 (Arya *et al.,* 2021).

In India, despite the fact that a large number of varieties and agro-techniques have been developed, the productivity of cowpea has still not reached the optimum level. Cowpea is well adapted to arid and semi-arid areas due to its morphological as well as biochemical characteristics. The deep root system and its short duration life cycle are some of the factors that make cowpea very adaptable to hostile environments. Some of the superior varieties 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 growth, green pod 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.

MATERIALS AND METHODS

Experimental site : A field experiment was conducted at research farm, Department of Vegetable Science, CCS Haryana Agricultural University, Hisar during rainy season during 2017-18 and 2018-19 for

two years. Hisar is located at latitude of 29º 10' North, longitude of 75º46' East and at an altitude of 215.2 meters above mean sea level.

Weather conditions : 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 44ºC to 48ºC 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.

Treatments and experimental design : There were total five varieties *viz*., P-263, Kashi Kanchan, Pusa Komal, Pusa Sukomal, Charodi-1, which were collected from different parts of the country developed by reputed research institutes, and laid out in a randomized block design with four replications.

Crop raising : Farmyard manure was incorporated at the rate of 10 t/ha in the soil before field preparation. The experimental field was prepared by two to three ploughing followed by planking to prepare suitable beds. The net size of each plot was 3.6 m×3.6 m. According to package of practices 40 kg phosphorus and 25 kg nitrogen per hectare was applied at the time of sowing in cowpea field. 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 moist field keeping the row to row distance 45 cm with the help of hand drawn plough. Fifteen days after sowing thinning was done to maintain the plant to plant spacing 20 cm. 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. The recommended plant protection measures were adopted as and when required for raising a healthy seed crop.

Data recording : The data on days to flower emergence was recorded when 50 per cent plants start flowering per plot. Plant height and number of branches was recorded at the time final harvest. The data of ten randomly selected plants was taken for final observation. These plants were tagged and all the above noted observations were taken from these plants. Pod length (cm) was measured on third picking from ten randomly selected pods from each plot. The final yield and number of pod per plot was recorded at each picking for this the pod per plot was counted and summed up to total numbers of pods per plot. The number of pods per plant was calculated by dividing the total numbers of pods per plot by number of plants per plot. The weight of each picking was recorded per plot and converted to pod yield per hectare (q).

Statistical Design : The pooled data presented in the Tables are the mean values of different parameters. The statistical method described by Panse and Sukhatme (1961) was followed for the analysis of variance and interpretation of experimental results. For this OPSTAT statistical software (http://14.139.232.166/opstat/index.asp) was used, developed by Chaudhry Charan Singh Haryana Agricultural University, Hisar, (Haryana) India. 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) x "t" at 5% for error degree of freedom

Where, S.E. (d) =Standard error (SE) of difference of two treatment meant

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

RESULTS AND DISCUSSION

The results presented in Table 1 clearly indicate that plant height at 90 days after sowing was recorded significantly maximum in variety Chirodi (109.4 and 90.1 cm) during both the years, respectively. The taller plants or much crop height is not beneficial in many crops as it leads to lodging. Although, minimum plant height was recorded (43.7 cm and 46.7 cm during 2017-18 and 2018-19, respectively) in Pusa Sukomal, which was statistically at par with P-263 during both the years and with Kashi Kanchan during first year only. The huge variation in plant height might be due to the genetic characteristic of the individual varieties (Kandel *et al*., 2019). This finding is in the accordance with the results of Patel *et al*., (2018) who reported significantly maximum plant height (260.97 cm) at 90 days after sowing with cowpea variety Arka Garima.

Early flowering in cowpea is also desired character for earliness. During both the years of

experimentation minimum days to commencement of first flower (40.0 and 41.2) was recorded in variety Kashi Kanchan during both the years which was significantly at par with P-263, whereas, Chirodi-1 was late in flowering during both the years. It is due to the inherent characters of variety. These results are in conformity with the findings of Patel *et al.,* (2018) and Futuless *et al.,* (2010) and Kalloo *et al.,* (2005) in vegetable cowpea.

Number of branches per plant (4.6 and 5.4 in first and second year, respectively) was recorded significantly higher in variety Kashi Kanchan, which was significantly at par with P-263 during both years of investigation (Table 1). The variation in number of branches among the varieties might be due to their genetically setup as well as climatic conditions of the growing area. Patel *et al*., (2018) also observed the similar result in cowpea.

The data presented in Table 2 revealed that the pod per plant and pod length varied significantly in all the varieties. Pod per plant (24.0 and 29.0) and pod length (20.0 cm and 21.8 cm) during 2017-18 and 2018-19, respectively) were found significantly higher in variety Kashi Kanchan closely followed by P-263 during both the years. Variation in pod per plant and pod length of cowpea might be due to variation in agro-climatic condition and variation in genotypes.

Likewise, green pod yield (Table 2) also followed the same trends and recorded significantly maximum 70.3 and 77.7 q/ha during 2017-18 and 2018-19, respectively in variety Kasha Kamchan closely followed in P-263 (66.4 and 73.9 q/ha). Chirodi-1 yielded the minimum green pod yield (16.7 and 20.0 q/ha) during both the years despite of its higher plant height. The higher green pod yield in the varieties may be due to its inherent genetic set up, suitability of climate, atmospheric condition and soil conditions of this region resulted more branches per plant, pods per plant, pod length ultimately increases yield of green pod. Pandey & Singh (2011) also observed similar finding. Patel and Kumari, 2018 in Gujarat reported that variety Kashi Kanchan was at par with the best performing variety of the experiment.

CONCLUSION

From the studies, it may be concluded that higher yield of cowpea may be obtained from the varieties having higher individual yield, number of pods per plant, individual pod length, early 50% flowering in nature. This study revealed that cowpea varieties Kashi Kanchan and P-263, which gives the better green pod yield as compare to the other varieties in the climatic conditions of Haryana. On the basis of above

TABLE 1
Evaluation of different varieties of cowpea for growth and flowering

Treatments	Plant height (cm)		Days to commencement of first flower		Branches/ plant	
	2017-18	2018-19	2017-18	2018-19	2017-18	2018-19
P-263	45.9	49.5	40.0	41.9	4.4	5.2
Kashi Kanchan	49.4	53.7	40.0	41.2	4.6	5.4
Pusa Komal	51.9	62.8	45.5	46.4	3.7	4.2
Pusa Sukomal	43.7	46.7	42.1	43.2	3.8	4.6
Charodi-1	109.4	90.1	48.6	51.8	4.0	4.3
CD at 5%	7.3	5.6	0.8	1.4	0.4	0.7

TABLE 2
Evaluation of different varieties of cowpea for yield contributing characters

Treatments	Pods per plant		Pod length (cm)		Pod yield (q/ha)	
	2017-18	2018-19	2017-18	2018-19	2017-18	2018-19
P-263	22. 7	27.1	19.8	21.3	66.4	73.9
Kashi Kanchan	24.0	29.0	20.0	21.8	70.3	77.7
Pusa Komal	14.1	20.0	14.3	16.8	31.1	39.1
Pusa Sukomal	21.0	25.0	17.6	18.5	61.1	62.2
Charodi-1	10.7	20.1	8.9	9.0	16.7	20.0
CD at 5%	2.8	2.4	2.0	3.0	5.8	5.3

facts, it may be concluded that, for benefits of the farmer and retailers, the variety Kashi Kanchan and P-263 are most beneficial.

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