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EFFECT OF DIFFERENT DATES OF SOWING ON GROWTH AND YIELD OF COWPEA IN VIEW OF CLIMATE CHANGE

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SUMMARY

A field experiment was planned to evaluate the performance of cowpea [*Vigna unguiculata* L.Walp] released cultivars under different dates of sowing during 2020-23 at the Research Farm of Vegetable Science, CCS HAU, Hisar. In the present study, three verities *viz.,* V1-P-263, V2-Kashi Kanchan and V3-Pusa Sukomal were sown at five different dates at 15 days interval *i.e.* D1-15 June, D2-1 July, D3- 15 July, D4-1 August and D5-14 August in Factorial RBD with three replications having plot size of 2.7 m x 2.0 m with spacing 45 cm x 20 cm. During 2020-21, the treatment combination D3V2 performed the maximum the production *i.e.* 99.30 q/ha followed by D3V1 (94.60 q/ha), D3V3 (93.80 q/ha), and D2V2 (93.80 q/ha). Likewise, during 2021-22, the treatment combination D3V2 performed the maximum the production *i.e.* 95.60 q/ha followed by D2V2 (93.10), D3V1 (91.70), and D3V1 (90.40). Opposite to earlier years results, during 2022-23, the treatment combination D2V2 performed the maximum the production *i.e.* 99.20 q/ha followed by D2V1 (95.30), D3V2 (94.50) and D2V2 (93.80). Therefore, sowing of cowpea variety, Kashi Kanchan may be recommended from 30th June to 15th July for commercial cultivation under Haryana conditions.

Keywords: Cowpea, variety, sowing time, climate change, growth, yield

Today, the entire world is worried about the impact of climate change on plants including the vegetable crops. In the last 200 years, due to industrial revolution the climatic factors are changing very fast that's why some of crops are facing problem of adaption in changed climate. (Arya *et al*., 2014). The effect of climate on vegetables production is associated to the variability's in local climatic factors rather than in international climate patterns. The average temperature of earth crust has increased by 1 degree F in just over the last century (Arya *et al*., 2020). Consequently, researchers consider any assessment has to be individually considering each location. Therefore, to face the challenges of climate change, concerted efforts are needed to evaluate, the released varieties of vegetable crops against the stressed environment.

Cowpea [*Vigna unguiculata* L.Walp] is a diploid (2n=22) self-pollinated species in the order Fabaceae, subfamily Faboideae (Papillionoideae), tribe Phaseoleae, subtribe Phaseolinae, genus Vigna. It is very important legume crop cultivated in developing countries of the tropics and subtropics (Nguyen *et al*., 2019a & b). In India, cowpea is mainly cultivated for fodder, green vegetable, green manure and soil-improving cover crop mainly grown in rainy and summer seasons (Panchta *et al*, 2021 & 2022). An excellent response was observed with the application of irrigation and other agronomic practices. Its green tender plants and leaves are used for feeding domestic animals as green fodder. Being a leguminous crop, it is also used for improving the soil fertility (Lal *et al*., 2017; Arya *et al*., 2019 & 2021). It's green tender pods are used as vegetable and mature dry seed used as whole grain pulse for human consumption (Oo *et al*., 2022 & 2023). It is a nutritive crop and rich source of protein both for animals as well as human beings (Vu *et al*., 2016; Lal *et al*., 2018). It is well known truth that the high yielding variety of cowpea is the primary requirement for a flourishing farmer (Majoka *et al*., 2021). But, to get full potential of new variety, it is a pre-requisite to identify the best promising sowing of a particular variety, which provides a better yield production for the same variety just manipulating in sowing dates under specific climatic conditions. The assessment of available crop varieties gives

TABLE 1
Mean performance on pod yield (q/ha) of cowpea in view of climate change

Treatments	Yield (q/ha)				B:C ratio
	2020-21	2021-22	2022-23	Mean	
D1V1	81.20	78.10	82.60	80.63	1.81
D1V2	85.60	85.60	87.10	86.10	1.97
D1V3	79.20	76.30	80.70	78.73	1.75
D2V1	89.40	86.70	95.30	90.47	2.10
D2V2	93.80	93.10	99.20	95.37	2.25
D2V3	86.90	85.90	93.70	88.83	2.05
D3V1	94.60	91.70	90.40	92.23	2.15
D3V2	99.30	95.60	94.50	96.47	2.28
D3V3	93.80	89.40	86.90	90.03	2.09
D4V1	72.20	72.30	74.10	72.87	1.58
D4V2	76.70	75.80	77.60	76.70	1.69
D4V3	69.80	66.10	70.20	68.70	1.45
D5V1	59.70	54.20	58.30	57.40	1.21
D5V2	63.10	56.70	61.60	60.47	1.31
D5V3	56.50	49.80	55.00	53.77	1.11
C.D. Factor (D)	3.90	5.69	2.48	-	-
C.D. Factor (V)	2.60	4.41	1.92	-	-
C.D. Factor D x V	NS	NS	NS	-	-

essential and effective information to the scientist for further improvement in yield (Vu *et al*., 2017; Oo *et al*., 2023).

MATERIALS AND METHODS

A field experiment was planned to evaluate the performance of cowpea [*Vigna unguiculata* L.Walp] released cultivars under different dates of sowing during 2020-21, 2021-22 and 2022-23 at the Research Farm of Vegetable Science, CCS HAU, Hisar. The experimental location in Hisar is situated at the latitude of 29º 10' N, the longitude of 75º46' E and at an altitude of 215.2 m above mean sea level on South-Western edge of the Rajasthan state and at a remoteness of about 175 kilometers in West direction, New Delhi. This region is characterized as 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 represent temperature in this area exhibit wide range from 44-48ºC in summer season and as low as up to freezing point accompanied with chill frost in the winter season (Majoka *et al*., 2021). Highest rainfall in this area is received during the months of July to September with showers in the month of January to late spring. In the present study, three verities *viz.,* V_1-P-263, V_2-Kashi Kanchan and V_3-Pusa Sukomal were sown during *kharif* season at five different dates at 15 days interval *i.e.* D_1-15 June, D_2-01 July, D_3-15 July, D_4-01 August and D_5-14 August in three growing seasons (2020-21, 2021-22 and 2022-23) in Factorial RBD with three replications having plot size of 2.7 m x 2.0m with spacing 45 cm x 20 cm. The observations were recorded on five competitive plants in each treatment for plant height (cm), number of pods per plant and pod yield per plant (kg). The data was subjected to the Factorial RBD statistical analysis as per standard procedure.

RESULTS AND DISCUSSION

The results of present study on cowpea yield performance are presented in Table 1. The statistical analysis revealed the significant differences among the varieties as well as among the different date of sowing. But, interaction among the varieties and sowing dates were found non-significant. This revealed that there is wide variation in yield of different varieties due to differences in their genetic makeup. Likewise, significant differences among the different date of sowing also revealed significant variation in production were also contributed by sowing date. But, D x V interaction non-significance means there was no synergetic effect among the

varieties and sowing dates.

During 2020-21, the treatment combination D3V2 performed the maximum the production *i.e.* 99.30 q/ha followed by D3V1 (94.60 q/ha), D3V3 (93.80 q/ha), D2V2 (93.80 q/ha) and D2V1 (89.40 q/ha). Likewise, during 2021-22, the treatment combination D3V2 performed the maximum the production *i.e.* 95.60 q/ha followed by D2V2 (93.10 q/ha), D3V1 (91.70 q/ha), D3V3 (89.40 q/ha), and D3V1 (90.40 q/ha). Opposite to earlier years results, during 2022-23, the treatment combination D2V2 performed the maximum the production *i.e.* 99.20 q/ha followed by D2V1 (95.30 q/ha), D3V2 (94.50 q/ha), D2V3 (93.70 q/ha), and D2V2 (93.80 q/ha). The critical analysis of the observation recorded for different treatments during the different years revealed that the performance of different treatment combinations varied from year to year due to climatic variations among the years.

The effective of any technology regarding to crop production (variety and sowing dates) especial in cowpea as vegetable production is based on its economics. Farmers adapt only those technologies which are economically viable. Therefore, on the average yield basis of the three years the B:C ratio was calculated and presented in Table 1, the treatment combination D3V2 performed the maximum the production 2.28 followed by D2V2 (2.25), D3V1 (2.15), D2V1 (2.10) and D3V3 (2.09).

On the basis of three year study, it can be concluded that maximum pod yield (96.47 q/ha & 95.37 q/ha) with B:C ratio (2.28 & 2.25) was obtained when cowpea cultivar Kashi Kanchan and Pusa Sukomal sown from 30th June to 15th July under Haryana conditions. Therefore, sowing of cowpea variety, Kashi Kanchan may be recommended from 30th June to 15th July for commercial cultivation under Haryana conditions. The evaluation of different varieties of legume crops under agronomic practices is essential to identify the best suited variety for a particular region under a set of agronomic practices to get the maximum production (Panghal *et al*., 2021; Kumar *et al*., 2023). The production of pulses is quite erratic due to variation in crop growing environments or climatic condition; therefore, yield evaluation of new varieties over the environments is also essential to observe the effect of climate change (Arya *et al*., 2023).

CONCLUSION

On the basis of three year study it may be concluded that maximum pod yield (96.47 q/ha & 95.37 q/ha) with B:C ratio (2.28 & 2.25) was obtained when cowpea cultivar Kashi Kanchan sown from 30th June to 15th July under Haryana conditions. Therefore, sowing of cowpea variety, Kashi Kanchan may be recommended from 30th June to 15th July for commercial cultivation under Haryana conditions.

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