The Andhra Agric. J 71 (2): 131-134, 2024
doi :10.61657/aaj.2024.104

Growth and yield of chickpea as influenced by different spacings

D Pedda Pitcha Naik, P Ammaji, S Bharathi and T Usha Rani
Department of Agronomy, Acharya N G Ranga Agricultural University,
Agricultural College, Bapatla-522101, Andhra Pradesh, India

ABSTRACT

A field experiment was carried out on loamy sand soils during *rabi*, 2023-2024 at Agricultural College Farm, Bapatla to assess the Growth and yield of chickpea as influenced by different spacings. The experiment was laid out in split plot design with three main plots and four sub plots and replicated thrice. The results of the investigation revealed that among the spacings tested, M_3- 22.5 cm x 7.5 cm recorded higher initial population m^{-2} (58), final population m^{-2} (56), plant height at harvest (57.8 cm), drymatter accumulation at harvest (4866 kg ha^{-1}) and straw yield (2981 kg ha^{-1}), whereas, number of pods $plant^{-1}$ (23.3), number of seeds pod^{-1} (1.24) were recorded under 30 cm x 10 cm spacing and higher grain yield (1863 kg ha^{-1}) was recorded with 22.5 cm x 10 cm. The chick pea variety recorded higher initial population m^{-2} (45), final population m^{-2} (43), growth parameters NBeG-857 *viz*., plant height (54.1) and drymatter accumulation (5141 kg ha^{-1}), yield attributes *viz*., number of pods $plant^{-1}$ (22.9), number of seeds pod^{-1} (1.23), grain yield (1849 kg ha^{-1}) and straw yield (2908 kg ha^{-1}) over other varieties of chickpea was NBeG 857.

Key words: *Chickpea, Growth, Spacing and Yield*

Pulses are one of the most significant food crops cultivated in the world because of their higher protein content. They are an essential part of the Indian diet, supplying much needed protein to the carbohydrate rich diet. Chickpea (*Cicer arietinum* L.*)* is an important major *rabi* pulse crop grown in India for its economic importance besides maintaining soil fertility and is often known as "King of pulses". India contributes 88% of total global bengalgram production, with 137.50 lakh tonnes grown on 102.65 lakh hectares with a productivity of 1447 kg ha^{-1} (FAO STAT, 2021). Among the temperate pulses, chickpea is the most tolerant crop to heat and drought stress because of its deep tap root system and it can withstand extended periods of drought by extracting water from deeper layers of the soil. In chickpea, choice of proper variety and spacing are the important criteria for increasing the productivity of a crop. Optimum plant population of a crop at one location may not be applied at other locations because of variation in fertility status of the soil, rainfall distribution, and nutrient and moisture availability. In chickpea, farmers are using heavy seed rate up to 125 kg ha^{-1}, which adversely affect the crop yield due to a greater number of plants per unit area (Rani *et al.,* 2022). In Andhra Pradesh, farmers believe that increased seed rates can result in higher yields as it can compensate for seedling mortality. But this will escalate the cost of cultivation. Therefore, selection of variety accompanied with optimum plant spacing in a region is very important to enhance the productivity of chickpea. In this context, present investigation was carried out to study the growth and yield of chickpea varieties as influenced by different spacings.

MATERIAL AND METHODS

A field experiment was conducted at Agricultural College Farm, Bapatla, Andhra Pradesh during *rabi*, 2023-24. The soil of the experimental field was sandy clay in texture, slightly alkaline in reaction (7.8) with electric conductivity of 0.34 dS m^{-1}, low in organic carbon (0.36%) and available nitrogen (216 kg ha-1), high in available phosphorus (54.3) and high in available potassium (330). Average mean maximum temperature was 30.4 and minimum temperature was 20.1 during the crop growth period. The total amount of rainfall received during the crop growing period was 326.6 mm received in five rainy days. Experiment was laid out in split plot design replicated thrice. Spacing were allocated to main plots (M_1- 30 cm x 10 cm @ 80 kg ha^{-1}, M_2- 22.5 cm x

Table.1. Initial and final plant population (m^{-2}), plant height (cm) and drymatter accumulation (kg ha^{-1}) of chickpea varieties as influenced by spacings

Treatments	Initial population (m^{-2})	Final population (m^{-2})	Plant height (cm)	Drymatter accumilation(kg ha^{-1})
Spacing				
M_1- 30 cm x 10 cm	33	31	51.6	4268
M_2- 22.5 cm x 10 cm	43	40	54	5120
M_3- 22.5 cm x 7.5 cm	58	56	57.8	4866
SEm±	1.3	1	1.2	163.9
CD (p = 0.05)	5	4	4.6	643
CV (%)	10.1	7.8	7.4	11.9
Varieties				
V_1- JG-11	43	41	51.4	4379
V_2- NBeG-452	45	42	53	4874
V_3- NBeG-776	44	43	59.3	4611
V_4- NBeG-857	45	43	54.1	5141
SEm±	1.4	1.9	1.3	152.4
CD (p = 0.05)	NS	NS	3.8	453
CV (%)	9.2	13.5	7	9.6
Interaction				
SEm±	2.4	3.3	2.2	264
CD at 5% M × V	NS	NS	NS	NS
CD at 5% V × M	NS	NS	NS	NS

Table.2. The variability in grain yield and other yield attributing traits of chickpea varieties as influenced by spacings

Treatments	No. of pods $plant^{-1}$	No. of seeds pod^{-1}	Grain yield (kg ha-1)	straw yield (kg ha-1)
Spacing				
M_1- 30 cm x 10 cm	23.3	1.24	1579	2339
M_2- 22.5 cm x 10 cm	21.2	1.13	1863	2792
M_3- 22.5 cm x 7.5 cm	17.8	1.02	1557	2981
SEm±	0.4	0.03	52	82
CD (p = 0.05)	1.7	0.12	204	322
CV (%)	7.4	9.15	10.8	10.5
Varieties				
V_1- JG-11	18.7	1.07	1447	2518
V_2- NBeG-452	21.5	1.14	1704	2728
V_3- NBeG-776	19.9	1.09	1666	2662
V_4- NBeG-857	22.9	1.23	1849	2908
SEm±	0.9	0.04	42.7	88.4
CD (p = 0.05)	2.7	NS	127	263
CV (%)	12.9	11.8	7.7	9.8
Interaction				
SEm±	1.5	0.08	73.9	153.1
CD at 5% M × V	NS	NS	NS	NS
CD at 5% V × M	NS	NS	NS	NS

10 cm @ 100 kg ha^{-1} and M_3- 22.5 cm x 7.5 cm @ 100 kg ha^{-1} and newly released chickpea varieties were allocated to subplots (V_1 - JG-11, V_2- NBeG-452, V_3-NBeG-776 and V_4- NBeG-857). Recommended dose of NPK was 20-50-20 kg ha^{-1} and was applied in the form of urea and single super phosphate. Entire dose of nitrogen and phosphorus applied as basal. Sowing was done on 22-11-2023.The recommended plant protection measures were followed whenever necessary. Five plants from each plot were selected randomly to record the biometric observations like plant height, drymatter accumulation (kg ha^{-1}), number of branches plant^{-1}, number of pods plant^{-1}, number of seeds pods^{-1} and seed index along with initial and finlal plant population m^{-2} of main plots. After harvest, grain yield (kg ha^{-1}), halum yield (kg ha^{-1}) and harvest index were recoverd. By taking into account the cost of cultivation and gross returns, net returns and benefit cost ratio were calculated. The soil samples after harvest and plant samples at harvest were collected after harvest of the crop from respective treatments and were analysed for available nutrient status and plant uptake respectively. All the data was analyzed statistically following the standard procedures as described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Growth parameters: Growth parameters were significantly affected by different treatments. The highest initial (58) and final population (56) was recorded in 22.5 cm x 7.5 cm. Significantly the highest plant height was recorded in M_3- 22.5 cm x 7.5 cm (57.8 cm) at all crop growth stages except at 30DAS. The drymatter accumulation was more in M_2-22.5 cm x 10 cm (5120) which is statistically at par with M_3- 22.5 cm x 7.5 cm (4866) and significantly superior to M_1- 30 cm x 10 (4268). With regards to the varieties of chickpea, V_3- NBeG-776 (59.3 cm) has retained its superiority in attaining more plant height while the drymatter accumulation was significantly more in V_4- NBeG-857 (5141) throughout all the growth stages and to be on par with V_2- NBeG-452 (4874) significantly superior to other varieties in trial viz., V_3- NBeG-776 (4611) and V_1 - JG-11 (4379). Similar results have also been reported by Patel (2020).

Yield attributes and yield: The yield attributes *viz*., number of pods plant^{-1} and seeds pod^{-1} was significantly higher in M_1- 30 cm x 10 (23.3). However, there is no significant difference between M_1- 30 cm x 10 (1.24) and M_2-22.5 cm x 10 cm (1.13) with regards to the number of seeds pod^{-1}. Among the varieties, V_4- NBeG-857 (22.9) recorded the highest number of pods plant^{-1} which is statistically at par with V_2- NBeG-452 (21.5) while significant differences were not observed between the varieties with regards to number of seeds pod^{-1}. These results are accordance with the findings of Nadeem *et al*. (2004) and Bavalgave *et al*. (2009). The improvement in yield attributing characters under lower plant population was not sufficient enough to compensate the loss of density for higher seed yield. Similar result was also reported by Munirathnam *et al*., (2015).

Among the spacings under investigation, M_2- 22.5 cm x 10 cm (1863 kg ha^{-1}) recorded the highest seed yield. While the halum yield was more with M_3- 22.5 cm x 7.5 (2981 kg ha^{-1}) and it is statistically at par with M_2- 22.5 cm x 10 cm (2792 kg ha^{-1}). Among the varieties tested, V_4- NBeG-857 (2908 kg ha^{-1}) recorded the highest seed yield, which is statistically at par with V_2- NBeG-452 (2728 kg ha^{-1}). However no significant differences were observed between V_4- NBeG-857 (39.53 %), V_2- NBeG-452 (38.48 %), and V_3- NBeG-776 (38.48 %) with regards to haulm yield. Harvest index was significantly more in M_2- 22.5 cm x 10 cm (40.33 %) which is statistically at par with M_1-30 cm x 10 cm (40.23 %).

CONCLUSION

Based on the findings, it could be concluded that 22.5 cm x 10 cm spacing shared significant results on crop growth and yield. Among the varieties, NBeG-857 recorded the highest growth parameters, yield attributes and yield over other varieties in Krishna zone of Andhra Pradesh under rice fallow conditions.

LITERATURE CITED

Bavalgave V G, Gokhale D N, Waghmare M S and Jadhav P J 2009. Growth and yield of Kabuli chickpea varieties as influenced by different spacing. *International Journal of Agricultural Sciences*, 5(1): 202- 204.

FAOSTAT 2021. production volume of pulses worldwide from 2010 to 2019. *https://www.statista.com/statistics/721945/*

pulses-production-volume-worldwide/

Gomez K A and Gomez A 1984. *Statistical Procedures for Agricultural Research*, 1st Ed., John Wiley Sons, New York.

Munirathnam P, Ashok K K, Jayalakshmi V and Padmalatha Y 2015. Suitability of chickpea 'NBeG 47' for mechanical harvesting under rainfed condition. *Journal of Food Legumes*, 28(2):1-3.

Nadeem M A, Ali A, Sohail R and Maqbool M 2004. Effect of different planting pattern on growth, yield and quality of grain legumes. *Pakistan Journal of Life and Social Sciences*, 2(2): 132-135.

Patel S 2020. To Study the Effect of diffrent spacing and phosphorus level on growth and yield of chickpea (*Cicer aeritinium* Var. *Kabulium* L.). *Indian Journal of Plant and Soil*, 7 (1).

Rani S, Sood Y, Kumari M and Loria K 2022. Effect of Seed Rate and Spacing on Nutrient Uptake in Chickpea. *International Journal of Plant & Soil Science* , 19-28.

Received on 23.04.2024 and Accepted on 05.06.2024