International Journal of Economic Plants

https://ojs.pphouse.org/index.php/IJEP

IJEP January 2026, 13(1): 01-04

Crossref

Article IJEP6668

Full Research

Natural Resource Management

Doi: HTTPS://DOI.ORG/10.23910/2/2026.6668

Evaluation of Growth and Yield Traits of Different Genotypes of Chickpea (*Cicer arietinum* L.)

Rashi Singh, S. N. Mishra* and Mudit Pandey

Dept. of Genetics and Plant Breeding, Prof. Rajendra Singh (Rajju Bhaiya) University, Prayagraj, U. P. (211 010), India

Corresponding Author

S. N. Mishra
e-mail: sonmishra2@gmail.com

Article History

Received on 04th September, 2025
Received in revised form on 29th November, 2025
Accepted in final form on 12th December, 2025
Published on 24th December, 2025

Abstract

The research was carried out during *rabi* (November, 2024–February, 2025) 2024–25 at Prof. Rajendra Singh (Rajju Bhaiya) university, Naini, Prayagraj to evaluate the yield and quality traits of five chickpea genotypes viz. PUSA 362, DNA334, Avrodhi, Himmat and Radhe .The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Each genotype was sown in plots of 2×2 m^2 size, with a row spacing of 30 cm and plant spacing of 10 cm. The crop was cultivated following recommended agronomic practices, including fertilization, irrigation, and pest management. The genotypes were assessed for various parameters, including plant height in cm, no. of branches, no. of pods $plant^{-1}$, seed yield (g) $plant^{-1}$, Seed yield $plot^{-1}$, seed yield q ha^{-1} and resistance to diseases. The data collected were subjected to analysis of variance (ANOVA) to determine significant differences among genotypes. The analysis was performed using statistical software. Significant variations were observed among the genotypes for most traits, indicating substantial genetic diversity. The results of this study provided valuable insights into the performance of these genotypes under specific environmental conditions, enabling breeders and farmers to select high-yielding and quality chickpea varieties for improved productivity and nutritional value.

Keywords: Genetic diversity, genotype, growth parameters, productivity

1. Introduction

Cultivated for its edible seeds, the chickpea, (*Cicer arietinum* L.), is an annual legume belonging to the Fabaceae family, subfamily Faboideae (Kumawat et al., 2021). The chickpea was first domesticated some 10,000 years ago during the First Agricultural Revolution, along with wheat, barley, peas, and lentils (Igolkina et al., 2023). Chickpeas are grown extensively in many subtropical and warm- temperate countries and are regarded as the third most important pulse in the world (Devi et al., 2023 and Dubey et al., 2024). The plant features tiny, fluffy leaves on either side of the stem and reaches a height of 20 to 60 cm (8 to 20 in). Its whiteblossomshaveveinsthatareeither pink, violet, or blue. Desi and Kabuli chickpeas are two different kinds that differ according to their seed physical features (Kumar et al., 2022). The Desi variety, which is grown in the semi-arid tropics (India), often has smaller, rougher-surfaced seeds which vary in color from yellow to black, whereas the Kabuli variety, which has larger, smoother, lighter-colored seeds, is grown in temperate regions (Mediterranean countries) (Asati et al., 2023). Chickpeas, which are grown all over the world, are regarded as a cheap and high-proteinpulse. Chickpeas area significant supply of vital minerals and vitamins, as well as an excellent source of fiber and protein and carbohydrates. Chickpea Nutrient Values 100 g^{-1} Energy Value 686 kj Calories 164 kcal 2.59 g of total fat, 27.42 g of carbohydrates, 4.80 g of sugars, and 7.6 g of dietary fiber 8.86 g of protein and 7 mg of sodium Potassium 291 mg, Zinc 1.53 mg, Iron 2.89 mg, Magnesium 1.030 mg, Copper 0.352 mg, and Calcium 49 mg 1.3 mg of vitamin C 0.35 mg of vitamin E 0.526 mg of vitamin B3 (niacin) 0.139 mg of vitamin B6 Vitamin B2 (riboflavin) 0.063 mg Vitamin B1 (thiamin) 0.116 mg (Begum et al., 2023 and Suman et al., 2023). Thus, the research was conducted to evaluate the yield and quality traits of five chickpea genotypes, PUSA 362, DNA334, Avrodhi, Himmat, Radhe and check variety aiming to identify superior varieties for cultivation. To meet the growing domestic demand caused by the rising population, India imports significant quantities of desi chickpea. However, over the past decade, the country has also emerged as a major exporter of kabuli chickpea, supplying nations such as Pakistan, Algeria, Turkey, Sri Lanka, and the UAE. India has achieved remarkable progress in

expanding both the area and production of chickpea. In the last twenty years, chickpea cultivation has increased by approximately 3.5 mha in the central and southern regions (Moin et al., 2023). This expansion has largely compensated for the decline in chickpea acreage in northern India, where irrigated lands were increasingly devoted to wheat cultivation. Globally, chickpea ranks as the third most important pulse crop (Muehlbauer and Sarker, 2017), cultivated in 57 countries across all continents, with a total production of 14.8 mt from 13.98 mha -an average yield of 1058 kg ha^{-1}. India leads the world in both area and production, accounting for about 67% of global chickpea output, with 10.17 mha under cultivation, 11.35 mt of production, and an average yield of 1116 kg ha^{-1}. Madhya Pradesh alone contributes 1.92 mha of area, 2.48 mt of production, and 1288 kg ha^{-1} productivity (Anonymous, 2020), the highest among pulse crops. Traditionally, chickpea varieties grown in northern India require lower temperatures and a longer winter season for optimal growth. This research was conducted to evaluate the yield and quality traits of five chickpea genotypes, PUSA 362, DNA334, Avrodhi, Himmat, Radhe and check variety aiming to identify superior varieties for cultivation.

2. Materials and Methods

The research was conducted during *rabi* (November, 2024–February, 2025) 2024–25 at the experimental farm of Prof. Rajendra Singh (Rajju Bhaiya) University, Naini, Prayagraj to evaluate the yield and quality of five different genotypes of chickpea namely Pusa 362, DNA334, Avrodhi, Himmat, and Radhe. The farm was located at an altitude of 1,938 m above mean sea level (Figure 1). The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Each genotype was sown in plots of 2×2 m^2 size, with a row spacing of 30 cm and plant spacing of 10 cm. The crop was cultivated following recommended agronomic practices, including fertilization, irrigation, and pest management. Data were collected on various yield and quality parameters like plant height in cm, no. of branches, no. of pods plant^{-1}, seed yield plant^{-1} (g), seed yield plot^{-1} (g) and yield (q ha^{-1}). Plant height was measured from the base of the plant to the tip of the main stem, and the number of branches plant^{-1} was counted. The number of pods plant^{-1} was counted, and seed yield plant^{-1} was recorded by weighing seeds from individual plants, and yield was calculated as the total weight of above-ground biomass. The data collected were subjected to analysis of variance (ANOVA) to determine significant differences among genotypes. The analysis was performed using statistical software.

Manual soil preparation activity Seed sowing

Figure 1: Layout of trial in the experimental farm

The study aimed to identify the best-performing genotypes in terms of yield and quality, which could be recommended for cultivation in the region. The results of this study would provide valuable insights into the performance of different chickpea genotypes and help farmers, researchers, and policy makers to make informed decisions.

3. Results and Discussion

The results of the study on the evaluation of five chickpea genotypes (Pusa 362, DNA 334, Avrodhi, Himmat, and Radhe) conducted at the experimental farm of Rajju Bhaiya University, Naini, Prayagraj, are presented below. The study aimed to identify the best-performing genotype in terms of growth, yield, and quality parameters, which could be recommended for cultivation in the region.

The perusal of data presented in Table 1 shows that the genotypes differed significantly in plant height (Figure 1-2). In comparison to other genotypes, Pusa 362 recorded maximum plant height (51.23 cm), followed by DNA-334 (50.67 cm) and Radhe (47.13 cm). Significant differences were observed in the number of branches plant^{-1}. Pusa 362 reported maximum number of branches (7.53), followed by DNA-334 (7.27) and Himmat (3.8), all of which differed considerably from the other genotypes.

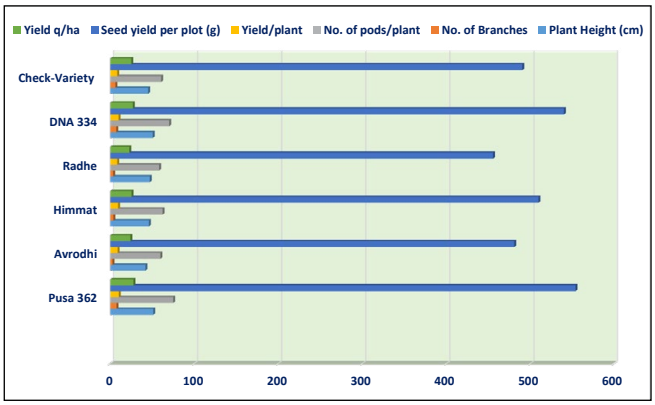

Figure 2: Based on growth and yield figures, the average performance graph of all chickpea (*Cicer arietinum* L.) genotypes

The data on seed yield represents that maximum seed yield was recorded in Pusa 362 (10.27 g) followed by DNA-334 (10.00), and Himmat (9.43). The superior performance of Pusa 362 in terms of No. of pods plant^{-1} (75), DNA-334 (10.00), and Himmat (62.37) was also significant. Pusa-362 had the highest seed yield plot^{-1} (553.9 g) and seed yield (27.27 q ha^{-1}), followed by DNA-334 (540 g; 27.00 q ha^{-1}) followed by Himmat

Table 1: Mean performance across all genotypes of chickpeas (*Cicer arietinum* L.) on the basis of growth and yield parameters

Genotypes	Plant Height (cm)	No. of branches	No. of pods plant^{-1}	Yield plant^{-1} (g)	Seed yield plot^{-1} (g)	Yield (q ha^{-1})
Pusa 362	51.23	7.53	75.00	10.27	553.9	27.72
Avrodhi	41.90	2.78	59.73	8.90	480.6	24.03
Himmat	46.07	3.8	62.37	9.43	509.4	25.47
Radhe	47.13	3.60	58.27	8.43	455.4	22.77
DNA 334	50.67	7.27	70.26	10.00	540	27.00
Check-Variety	45.2	6.2	60.7	8.39	490.2	25.10
CD (p=0.05)	3.65	2.63	6.90	0.93	50.44	2.52
CD (p=0.01)	5.31	3.82	10.04	1.36	73.39	3.66
C.V.	4.09	27.94	5.63	5.26	5.27	5.26

variety with seed yield plot^{-1} of 509.4 g and seed yield of 25.47 q ha^{-1}. Plot yield (490.2 g), plant height (45.2 cm), number of branches (6.2), number of pods plant^{-1} (60.7), seed yield plant^{-1} (8.39), and yield q ha^{-1} (25.10) were the parameters recorded for the check variety. The findings of the present study also aligned with the research conducted by Kumar et al. (2022), Suman et al. (2023), Moin et al. (2023) and Dubey et al. (2024). Each component of data was considered important could be attributed to the plant's genetic composition and climate-adaptability.

4. Conclusion

The results of the study clearly indicated that Pusa 362 was the best-performing genotype in the given climatic region. Its superior performance in terms of growth and yield parameters made it an ideal choice for cultivation. The higher number of branches, pods plant^{-1}, and seed yield plant^{-1} in Pusa 362 contributed to its higher seed yield.

5. Acknowledgement

The Rajendra Singh (Rajju Bhaiya) University Prayagraj, U.P, India and Sciences are gratefully acknowledged by the authors for providing all necessary facilities and resources.

7. References

Asati, R., Tripathi , M.K., Yadav , R.K., Tiwari , S., Chauhan , S., Tripathi , N., Solanki , R.S., Yasin , M., 2023. Morphological description of chickpea (*Cicer arietanum* L.) genotypes using DUS Characterization. International Journal of Environment and Climate Change 13(9), 1321–1341. https://doi.org/10.9734/ijecc/2023/v13i92361.

Anonymous, 2020. State-wise fourth advance estimates of production of food grain during 2019–20. Directorate of Pulse Development. Retrieved from:https://dpd.gov.in/NLMT%20Report%20Rabi%20-2019-20.pdf.

Begum, N., Khan, Q.U., Liu, L.G., Li, W., Liu, D., Haq, I.U., 2023. Nutritional composition, health benefits and bio-active compounds of chickpea (*Cicer arietinum* L.). Frontiers in Nutrition 10, 1218468. https://doi.org/10.3389/fnut.2023.1218468.

Devi, P., Awasthi, R., Jha, U., 2023. Understanding the effect of heat stress during seed filling on nutritional composition and seed yield in chickpea (*Cicer arietinum* L.). Scientific Reports 13, 15450. https://doi.org/10.1038/s41598-023-42586-0.

Dubey, A.K., Rawat, A.K., Mishra, P., Tiwari, A., 2024. Assessment of growth, yield attributes and yield of chickpea (*Cicer arietinum* L.) cultivars under varying environments. Biological Forum-An International Journal 16(1), 315–318. https://www.researchtrend.net/bfij/pdf/Assessment-of-Growth-Yield-Attributes-and-yield-of-Chickpea-Abhijeet-Kumar-Dubey-64.pdf.

Kumawat, S., Babbar, A., Tiwari, A., Singh, S., Solanki, R.S., 2021. Genetic studies on yield traits of late sown elite kabuli chickpea lines. The Indian Journal of Agricultural Sciences 91(4), 634–638. https://epubs.icar.org.in/index.php/IJAgS/article/view/112740.

Igolkina, A.A., Noujdina, N.V., Vishnyakova, M., Longcore, T., von Wettberg, E., Nuzhdin, S.V., Samsonova, M.G., 2023. Historical routes for diversification of domesticated chickpea inferred from landrace genomics. Molecular Biology and Evolution 40(6). https://doi.org/10.1093/molbev/msad110.

Kumar, M., Khan, N., Sachan, R., Tiwari, A., 2022. Effect of different sowing environment on growth parameters, yield and yield components of chickpea (*Cicer aretinum* L.) varities. International Journal of Plant & Soil Science 34(20), 679–687. https://doi.org/10.9734/ijpss/2022/v34i2031204.

Moin, M., Rao, J.M.P., Parimala, K., Anuradha, C., 2023. Study of genetic variability parameters for yield and its

components under normal and late sown conditions in chickpea (*Cicer arietinum* L.). International Journal of Environment and Climate Change 13(11), 1400–1408. https://doi.org/10.9734/ijecc/2023/v13i113292.

Muehlbauer, F.J., Sarker, A., 2017. Economic importance of chickpea: Production, value, and world trade. In: The Chickpea Genome . Springer, pp. 5–12. https://doi.org/10.1007/978-3-319-66117-9_2.

Suman, P., Lal , G.M., Sree, J.S., 2023. Genetic analysis for seed yield and its yield components in chickpea (*Cicer arietinum* L.). International Journal of Plant & Soil Science 35(19), 1576–1587. https://doi.org/10.9734/ijpss/2023/v35i193703.