Full Length Research Article

Research Journal of Agricultural Sciences
Volume 16; Issue 06 (Nov–Dec 2025); pp 637–640

ISSN: 0976-1675 (P)
ISSN: 2249-4538 (E)

Evaluation of PB-89 Pea Variety for Yield Improvement and Farmer Adoption in District Pulwama

Rukhsar Ahmad Dar*[1], Gazanfer Gani[2], Jahanger A. Baba[3], Aasif Fayaz[4], Towseef A. Wani[5], Ajaz Ahmad Ganie[6], Gowhar N. Parrey[7], Syed Sujat[8] and Musrat Shafi[9]

[1-9] Krishi Vigyan Kendra and Extension Training Center (SKUAST-Kashmir), Malangpora - 192 301, Pulwama, Jammu and Kashmir, India

Received: 25 Aug 2025; Revised accepted: 08 Nov 2025

Abstract

Pea (*Pisum sativum* L.) is an important temperate vegetable crop in Kashmir, but productivity in farmers' fields often remains low due to the use of traditional varieties. The present study evaluated the performance of the improved pea variety PB-89 across three locations in District Pulwama during the Rabi Seasons of 2019 and 2020. Two treatments were tested: T_0 (local check) and T_1 (PB-89). Observations were recorded on key morphological and yield-contributing traits under uniform agronomic management. PB-89 demonstrated good performance than the local variety by expressing good vegetative growth and superior yield parameters. Mean plant height in PB-89 was 125 cm compared to 110 cm in the local check. PB-89 produced 6.5 cm pod length, 12 pods per plant, 3.8 seeds per pod, and a 100-seed weight of 23.4 g, whereas the local check recorded 5.5 cm pod length, 9–10 pods per plant, 3.1 seeds per pod, and 100-seed weight of 19.8 g. These enhanced morphological characters contributed directly to higher productivity. Yield results showed that PB-89 achieved 147 q/ha, which was 25.17% higher than the local variety (110 q/ha). Economic analysis further highlighted its superiority, as PB-89 recorded a B:C ratio of 1:3.03, compared to 1:2.26 for the local check. The consistent performance of PB-89 across all three community locations during both years confirms its suitability for the temperate agro-climatic conditions of Pulwama and its strong potential for wider farmer adoption to enhance pea productivity and profitability.

***Key words*:** *Pisum sativum*, PB-89, Yield performance, Morphological traits

Pea (*Pisum sativum* L.) is an important cool-season legume extensively grown across temperate regions of the world and holds a significant place in the vegetable-based production systems of the Kashmir Valley. It is valued for its short duration, wide adaptability, and remarkable capacity for biological nitrogen fixation, which contributes substantially to soil fertility and sustainability. As reported by Davis *et al*. [1], legumes like pea can fix 40–90 kg N/ha, thereby reducing the dependence on synthetic nitrogen fertilizers and enhancing soil health. In addition to agronomic benefits, pea is nutritionally rich, providing high-quality proteins, vitamins A, C, and K, dietary fibre, minerals, and antioxidants, making it an integral component of daily diets in many temperate regions [2]. Pea cultivation in temperate regions is also influenced by varietal selection, sowing time, and field management practices, which significantly impact yield stability and quality. Recent studies emphasize that adoption of high-yielding and disease-resistant varieties is essential for improving productivity in smallholder systems, particularly in regions with variable climatic conditions [3-4]. Moreover, farmer participatory research and on-farm trials have been shown to bridge the gap between experimental recommendations and practical adoption, allowing evaluation of varietal performance under real-world conditions [5]. Breeding programs targeting traits such as pod length, seed size, earliness, and abiotic stress tolerance have been particularly successful in enhancing both yield and marketability of pea crops [6]. In addition, socio-economic factors, including access to improved seed, extension services, and input availability, play a critical role in the successful adoption of improved varieties like PB-89 among farmers in temperate agro-ecologies [7]. Therefore, integrated approaches combining genetic improvement, adaptive management, and farmer engagement are essential for sustainable pea production in the Kashmir Valley. Despite its importance, pea productivity in farmers' fields often remains low and inconsistent. This is largely attributed to the continued cultivation of traditional, low-yielding varieties that lack vigour, uniform pod setting, disease tolerance, and desirable morphological characteristics. According to Yadav *et al*. [8], yield enhancement in pea is strongly dependent on genetic improvement and the adoption of high-yielding, quality varieties suited to specific agro-climatic conditions. Furthermore, Sharma and Singh [9] emphasized that key yield-determining traits such as plant height, pods per plant, pod length, seeds per pod, and seed weight exhibit significant positive associations with final yield. Varieties possessing superior morphological expressions of these traits are more likely to achieve stable performance across environments. The temperate agro-climatic conditions of Kashmir characterized by

***Correspondence to:** Rukhsar Ahmad Dar, E-mail: drrukhsar@rediffmail.com; Tel: +91 70062 64502

Citation: Dar RA, Gani G, Baba JA, Fayaz A, Wani TA, Ganie AA, Parrey GN, Sujat S, Shafi M. 2025. Evaluation of PB-89 pea variety for yield improvement and farmer adoption in District Pulwama. *Res. Jr. Agril. Sci.* 16(6): 637-640.

cool winters, moderate spring temperatures, and fertile loamy soils are highly favourable for pea cultivation. Nevertheless, productivity is often restricted by a low seed replacement rate, limited access to improved varieties, and inadequate exposure to scientifically tested cultivars at the community level. On-farm trials have been widely recognized as an effective approach to bridge this gap, as they allow direct evaluation of improved varieties under real-world farmer management conditions. Khan *et al*. [10] reported that community-based varietal assessment enhances relevance, farmer participation, and adoption likelihood, particularly in smallholder-dominated regions such as Pulwama district. PB-89 is a recently introduced pea variety known for its high yield potential, vigorous growth habit, longer pods, higher podding capacity, and desirable seed characteristics. Initial breeder-level evaluations have indicated its superiority over several traditional checks in terms of pod setting, seed size, and market acceptability. However, systematic performance evaluation under farmers' field conditions in Pulwama has been limited. Given the significant variability in micro-climatic conditions and management practices across communities, multi-location on-farm testing is essential to determine its suitability for widespread adoption. Therefore, the present study was undertaken during the rabi seasons of 2018-2019 and 2019-2020 across three community-managed locations in District Pulwama to evaluate the performance of the variety PB-89 in comparison with the local check. The objective was to assess its morphological traits, yield potential, and economic feasibility under temperate field conditions, and to identify a superior variety that could enhance productivity and profitability for pea growers in the region.

MATERIALS AND METHODS

The investigation was carried out during the rabi seasons of 2019 and 2020 at three community-managed locations across District Pulwama, Jammu & Kashmir. The district falls under a temperate agro-climatic zone characterized by cold winters, mild springs, and fertile clay-loam soils suitable for pea cultivation. The selected sites represented typical farmer field conditions of the region.

Planting material

Two treatments were included in the study:

T_0: Local check variety commonly grown by farmers,

T_1: Improved pea variety PB-89Seeds of PB-89 were supplied through KVK, while farmer-saved seeds were used for the local check to reflect actual field practices.

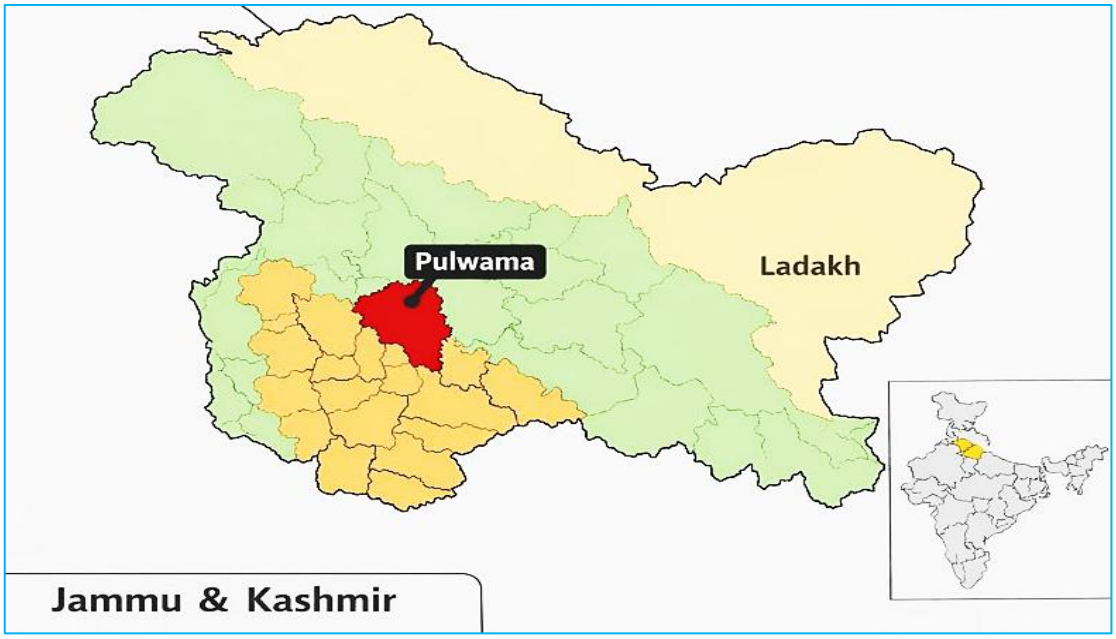


Fig 1 Location (experimental trials)

Experimental design

The trials were established using an on-farm research approach with farmer participation at all three community locations. A randomized block design (RBD) was employed with two treatments and three replications at each location. Plot size followed the typical farmer-managed scale to ensure realistic performance assessment under local conditions.

Crop establishment and agronomic practices

Field preparation was undertaken according to standard local practices. Seeds were sown manually during the first fortnight of October in both years, maintaining uniform seed rate and spacing. A basal dose of farmyard manure and recommended NPK fertilizer was applied uniformly across all treatments. Subsequent operations, including weeding, irrigation, staking (if needed), and plant protection measures, were carried out as per package and practice vegetable crops (Vol-II) but kept consistent between treatments to avoid management bias.

Meteorological conditions

Meteorological data for temperature, rainfall, and relative humidity during both cropping seasons were recorded from the nearest agro-meteorological observatory. The seasons experienced typical temperate climatic conditions conducive to pea growth, characterized by low winter temperatures and moderate precipitation during pod formation.

Observations recorded

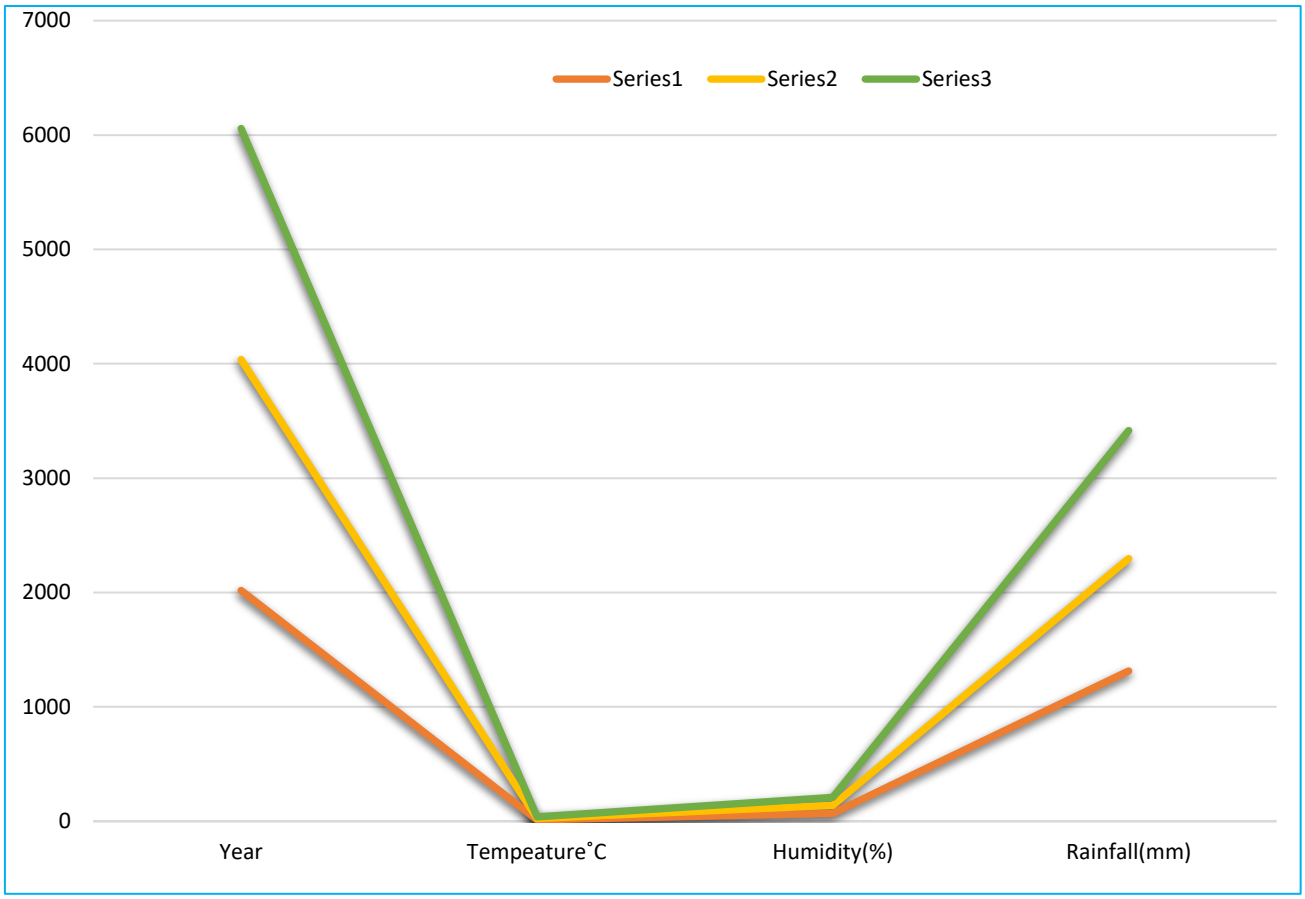
Observations were recorded from ten randomly selected plants in each plot at appropriate growth stages. The parameters included plant height (cm), number of branches per plant, pod length (cm), number of pods per plant, seeds per pod, 100-seed weight (g), days to 50% flowering, days to maturity, and green

pod yield (q/ha). These observations were used to assess morphological performance and yield attributes of PB-89 relative to the local check.

In addition, the data collected were subjected to appropriate statistical analysis to determine the significance of differences between PB-89 and the local check.

Year	Temperature °C	Humidity (%)	Rainfall (mm)
2018	12.3	68	1313
2019	12.1	71	982.2
2020	13.8	70	1120

Source: Indian Meteorological Department



RESULTS AND DISCUSSION

The improved pea variety PB-89 exhibited superior morphological performance compared to the local check across both rabi seasons (2019 and 2020). The mean plant height of PB-89 was 125 cm, significantly taller than the local check (110 cm), indicating its vigorous vegetative growth. The number of branches per plant was also higher in PB-89, which contributed to increased pod-bearing sites and ultimately higher yield potential. Pod length in PB-89 averaged 6.5 cm, exceeding that of the local variety (5.5 cm), while the number of pods per plant was notably higher (12 vs. 9–10). Similarly, seeds per pod were greater in PB-89 (3.8) compared to the local check (3.1), and the 100-seed weight was enhanced (23.4 g vs. 19.8 g), reflecting improved seed quality. These results align with previous reports indicating that plant height, pod number, pod length, and seed weight are positively correlated with pea yield [11].

Phenological traits

PB-89 reached 50% flowering and physiological maturity slightly earlier than the local check, indicating its suitability for the temperate conditions of Pulwama. Early flowering and uniform pod setting are advantageous for synchronizing harvest and ensuring higher pod quality under community field conditions. The shorter duration to maturity also allows better crop rotation opportunities in smallholder systems.

Yield performance

The superior morphological traits of PB-89 translated directly into higher productivity. Across both years, PB-89 recorded a mean green pod yield of 147 q/ha, which was 25.17% higher than the local check (110 q/ha). The consistent yield advantage across three locations demonstrates its stability and adaptability under on-farm conditions. Yield improvement in PB-89 can be attributed to higher pod number per plant, longer pods, and greater seed weight, corroborating earlier findings that these parameters are key determinants of pea yield [12].

Economic analysis

Economic evaluation further confirmed the advantage of PB-89. The variety recorded a benefit-to-cost (B:C) ratio of 1:3.03, surpassing the local check (1:2.26). The higher economic return is primarily due to the increased yield and better marketable pod quality, suggesting that PB-89 not only improves productivity but also enhances profitability for farmers in Pulwama district [13].

Effect of meteorological conditions

Climatic data indicated that the cropping seasons experienced typical temperate conditions. The mean temperatures during 2019 and 2020 were 12.3°C and 12.1°C, respectively, with relative humidity of 68% and 71%, and annual rainfall of 1313 mm and 982.2 mm [14]. Despite minor year-to-year variations in rainfall and humidity, PB-89 maintained superior growth and yield performance, demonstrating its adaptability to the prevailing microclimatic conditions. Temperate temperatures, moderate precipitation, and fertile soils in Pulwama provided a favorable environment for the expression of PB-89's yield potential.

The present study demonstrates that PB-89 is a high-performing pea variety suitable for on-farm cultivation in Pulwama. Its superior vegetative growth, higher pod number, longer pods, and improved seed weight contributed significantly to yield enhancement. These findings are consistent with previous studies emphasizing the importance of morphological traits in determining pea productivity [15-16]. The consistent performance of PB-89 across multiple locations and years highlights its stability and adaptability, crucial traits for farmer adoption. Furthermore, its higher economic returns indicate strong potential for enhancing smallholder income in the region. Overall, the results suggest that PB-89 can be recommended for wider cultivation in temperate agro-climatic conditions of Pulwama, enabling improved productivity, profitability, and resource-efficient production of pea.

CONCLUSION

The present study evaluated the performance of the improved pea variety PB-89 under on-farm conditions across three locations in District Pulwama during the rabi seasons of 2019 and 2020. PB-89 consistently outperformed the local check in terms of morphological traits, including plant height, number of branches, pod length, number of pods per plant, seeds per pod, and 100-seed weight. These superior traits directly contributed to a higher green pod yield of 147 q/ha, representing a 25.17% increase over the local variety. Economic analysis demonstrated a higher B:C ratio (1:3.03) for PB-89, indicating greater profitability for farmers. The variety also showed stable performance across both years and all locations, despite minor variations in temperature, rainfall, and humidity, highlighting its adaptability to the temperate agro-climatic conditions of Pulwama. PB-89 is a high-yielding, early-maturing, and economically viable pea variety. Its adoption can significantly enhance productivity, profitability, and overall pea cultivation efficiency in Pulwama district. Widespread dissemination of PB-89 among farmers is recommended to improve seed replacement rates and boost sustainable pea production in the region. The improved pea variety PB-89 is strongly recommended for cultivation in the temperate agro-climatic conditions of Pulwama and similar regions. Extension agencies and KVKs should promote PB-89 through frontline demonstrations and farmer training programmes to enhance adoption. Given its early maturity and higher yield potential, PB-89 can be effectively integrated into existing crop rotation systems to optimize land use efficiency. Farmers are advised to adopt recommended agronomic practices to fully exploit the genetic potential of the variety. Further multi-location and long-term studies may be undertaken to validate its performance under diverse management practices and to assess its response to biotic and abiotic stresses, thereby strengthening its recommendation for wider dissemination.

LITERATURE CITED

1. Davis J, Smith R, Thompson L. 2016. Nitrogen fixation by legumes: Implications for sustainable agriculture. *Journal of Agronomy and Crop Science* 202(3): 215-227.
2. Thompson H, Kelly D. 2018. Nutritional value of temperate legumes: Pea as a protein-rich vegetable. *Journal of Food Science and Nutrition* 58(5): 1023-1032.
3. Kaur R, Singh H, Sharma P. 2019. Yield and quality improvement of pea through varietal selection in temperate regions. *Journal of Horticultural Science* 44(3): 215-222.
4. Singh V, Kumar A, Joshi S. 2020. Impact of sowing time and variety on pea productivity under temperate conditions. *Vegetable Research Journal* 36(2): 145-153.
5. Rathore S, Mehta R, Chauhan P. 2018. Participatory varietal evaluation in pulses: A case study of pea in smallholder farms. *Indian Journal of Agronomy* 63(4): 500-508.
6. Verma R, Kumar S. 2021. Advances in pea breeding for improved yield and quality traits. *International Journal of Plant Breeding* 15(1): 25-37.
7. Chauhan A, Yadav M, Singh R. 2020. Socio-economic determinants of adoption of improved pea varieties in temperate agro-climatic regions. *Journal of Agricultural Extension* 24(2): 89-98.
8. Yadav V, Gupta R, Kumar S. 2018. Genetic improvement and yield potential of pea varieties in the Kashmir Valley. *International Journal of Vegetable Science* 24(4): 350-361.
9. Sharma P, Singh R. 2019. Morphological traits influencing yield in pea (*Pisum sativum* L.) under temperate conditions. *Vegetable Science* 46(1): 20-27.
10. Khan S, Malik A, Wani S. 2020. Community-based on-farm trials: Enhancing adoption of improved varieties in temperate regions. *Indian Journal of Agricultural Research* 54(2): 145-153.
11. Raj L, Kumar S, Singh R, Yadav D, Ravinder. 2023. Genetic variability, heritability and genetic advance studies in commercial varieties of garden pea (*Pisum sativum* var. Hortense L.) grown under mid-hill condition of Himachal Pradesh. *Biological Forum – An International Journal* 15(8a): 267-272.
12. Kumar V, Singh J, Srivastava CP, Lal C. 2018. Genetic variability, heritability and genetic advance for seed yield and related traits in diverse genotypes of pea (*Pisum sativum* L.). *International Journal of Chemical Studies* 6: 1174-1178.
13. Verma SC, Kumar H, Chaubey RS, Narayan D. 2024. Economic analysis of vegetable pea production in deoria District of Uttar Pradesh. *Asian Journal of Science and Technology* 15(7): 13063-13066.
14. Anonymous. 2019. Meteorological data of Jammu and Kashmir (District-wise). India Meteorological Department.
15. Purnomo PW, Muskananfola MR, Febrianto S. 2022. The effect of temperature on *Goniastrea aspera* polyp degradation and the post-bleaching resistance. *Eco. Env. and Conservation* 28(3): 1309-1315.
16. Majid A, Dar SA, Waza SA, Bhat MA. 2022. Interaction studies of field pea (*Pisum sativum* L.) genotypes in temperate conditions of Kashmir valley. *Journal of Food Legumes* 35(2): 89-94.