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Performance of different varieties of garden pea (*Pisum sativum* L.) for growth and yield under open field conditions

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Abstract

A field trial was performed at the Agricultural Research Field of Rama University, Mandhana, Kanpur, during the *rabi* period of 2026, involving eight garden pea (*Pisum sativum* L.) cultivars to examine their development and productivity using a Randomized Block Design with three replications under open field settings. The investigation showed notable variations, with Pusa Pragati demonstrating superior plant stature (89.50 cm), branch count per plant (6.4), early sprouting (5.5 days), germination rate (94.3%), initial blooming (38.7 days), pod size (10.60 cm), pod quantity per plant (25.8), peas per pod (8.6), pod mass per plant (198.7 g), and hectare yield (12.40 t/ha). Kashi Mukti followed closely in performance. Regarding economic aspects, Pusa Pragati achieved the top net profit (₹2,30,000/ha) and benefit-cost ratio (3.87). Pod production per plant displayed strong positive associations with various growth and output characteristics. Among the eight cultivars, Pusa Pragati proved most economically viable under the open field environment in Kanpur.

Keywords: Garden pea, varietal evaluation, growth parameters, yield attributes, open field, Kanpur conditions

Introduction

Garden pea (*Pisum sativum* L.), a member of the Fabaceae family (2n=14), is an important cool-season legume valued for its high protein content, nutritional quality, and versatility in human diets and soil health improvement through nitrogen fixation. In India, it is a major *rabi* vegetable crop, primarily grown in northern and north-western states. The country cultivates peas on 568-580 thousand hectares with an annual production of 5.8-6.2 million tonnes of green pods, Uttar Pradesh being the leading producer. Globally, production stands at 18-20 million tonnes from 6.8-7.2 million hectares, with China and India contributing over 60% of the total output. The crop provides essential nutrients, including 23-33% protein, vitamins, minerals, and dietary fibre. In the Kanpur region of central Uttar Pradesh, with its subtropical climate, sandy loam soils, and limited winter rainfall, garden pea is commercially important but often under-performs due to poor varietal selection. The present study was conducted at Rama University, Mandhana, Kanpur during the *rabi* season of 2025-2026 to evaluate eight varieties under open field conditions and identify the most suitable one for local agro-climatic conditions.

Materials and Methods

The experiment was conducted at the Agricultural Research Field, Rama University, Mandhana, Kanpur (Uttar Pradesh) during the *rabi* season of 2026. The soil was sandy loam with pH 7.8-8.2, low organic carbon (0.35-0.55%), and moderate fertility. Weekly meteorological data were recorded from November 2025 to March 2026. The trial was laid out in a Randomized Block Design (RBD) with eight varieties and three replications. Treatments were: T₁ - Kashi Nandhini, T₂ - Rachna New, T₃ - Kashi Samarth, T₄ - Pusa Pragati, T₅ - Matar Ageta-6, T₆ - Pant Uphar, T₇ - Kashi Samridhhi, and T₈ - Kashi Mukti. Plot size was 1.7 m × 1.0 m with 30 cm × 10 cm spacing. Sowing was done in the first week of November 2026 at a seed rate of 80 kg/ha. Recommended fertilizers (FYM 10 t/ha, N 25 kg/ha, P₂O₅ 75 kg/ha, K₂O 50 kg/ha) were applied

as basal dose (full P & K + half N) and top-dressed (remaining N at 30 DAS). Standard irrigation, weeding, and plant protection practices were followed. Observations were recorded on five randomly selected plants per plot. Growth parameters included days to germination, germination%, plant height at 90 DAS, branches per plant, days to first flowering, and days to 50% flowering. Yield parameters comprised pod length, pods per plant, peas per pod, pod weight per plant, 100-pod weight, test weight, and green pod yield (t/ha). Data were analysed using ANOVA for RBD. Means were compared by critical difference

(CD) at 5% probability level. S.Em ($\pm$) and CV (%) were also calculated.

Results and Discussion: The field experiment on garden pea (*Pisum sativum* L.) was conducted during the *rabi* season of 2026 at the Agricultural Research Field, Rama University, Mandhana, Kanpur. Data on growth and yield parameters were recorded and analysed statistically using Randomized Block Design (RBD). Significant differences were observed among the eight varieties for all characters studied.

Growth Parameters

Table 1: Mean Performance of Garden Pea Varieties for Growth Parameters under Open Field Condition

Treatments	Days to Germination	Germination (%)	Plant Height at 90 DAS (cm)	Branches per Plant	Days to First Flowering	Days to 50% Flowering
T ₁ - Kashi Nandhini	6.2	89.4	63.40	4.8	42.5	48.2
T ₂ - Rachna New	6.5	87.2	60.50	4.5	44.3	50.6
T ₃ - Kashi Samarth	5.8	91.6	72.80	5.6	40.8	46.9
T ₄ - Pusa Pragati	5.5	94.3	89.50	6.4	38.7	44.2
T ₅ - Matar Ageta-6	7.1	82.5	54.20	3.9	46.5	52.4
T ₆ - Pant Uphar	6.4	86.8	69.60	5.1	43.6	49.8
T ₇ - Kashi Samriddhi	6.0	90.2	71.20	5.4	41.7	47.5
T ₈ - Kashi Mukti	5.6	93.5	86.70	6.1	39.4	45.1
S.Em ($\pm$)	0.28	1.45	2.10	0.32	0.85	0.95
CD (5%)	0.84	4.35	6.30	0.95	2.55	2.85
CV (%)	4.75	5.20	6.85	7.10	3.95	4.20

Bold values indicate the superior variety. Pusa Pragati (T₄) recorded the earliest germination (5.5 days), highest germination percentage (94.3%), tallest plants (89.50 cm), maximum branches per plant (6.4), and earliest flowering (38.7 days to first

flowering and 44.2 days to 50% flowering). Kashi Mukti (T₈) ranked second. These results clearly demonstrate the genetic superiority of Pusa Pragati for vegetative growth and earliness under Kanpur conditions.

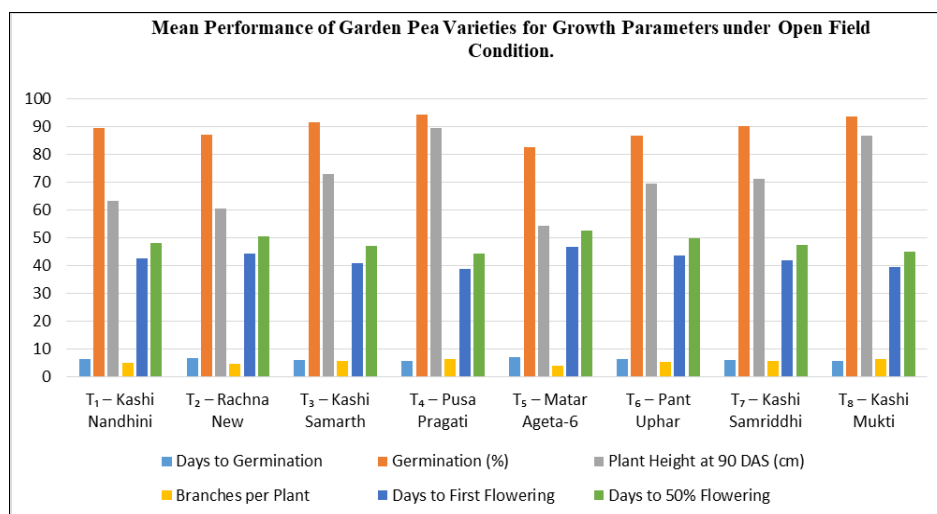


Fig 1: Mean Performance of Garden Pea Varieties for Growth Parameters under Open Field Condition

Yield Parameters

Table 2: Mean Performance of Garden Pea Varieties for Yield Parameters under Open Field Condition

Treatments	Pod Length (cm)	Pods per Plant	Peas per Pod	Pod Weight per Plant (g)	100-Pod Weight (g)	Test Weight (g)	Green Pod Yield (t/ha)
T ₁ - Kashi Nandhini	8.40	18.5	6.8	145.6	720	21.5	8.20
T ₂ - Rachna New	8.10	17.8	6.5	138.4	705	20.8	7.75
T ₃ - Kashi Samarth	9.20	21.4	7.4	168.2	760	23.6	9.85
T ₄ - Pusa Pragati	10.60	25.8	8.6	198.7	845	26.2	12.40
T ₅ - Matar Ageta-6	7.20	15.6	5.9	120.3	650	18.4	6.10
T ₆ - Pant Uphar	8.85	20.2	7.1	158.6	735	22.7	9.10
T ₇ - Kashi Samriddhi	9.10	21.0	7.3	164.5	755	23.1	9.60
T ₈ - Kashi Mukti	10.20	24.6	8.2	186.9	820	25.4	11.80
S.Em ($\pm$)	0.28	0.95	0.22	5.40	18.5	0.85	0.45
CD (5%)	0.84	2.85	0.66	16.20	55.5	2.55	1.35
CV (%)	5.40	6.25	5.10	7.30	6.80	5.95	8.10

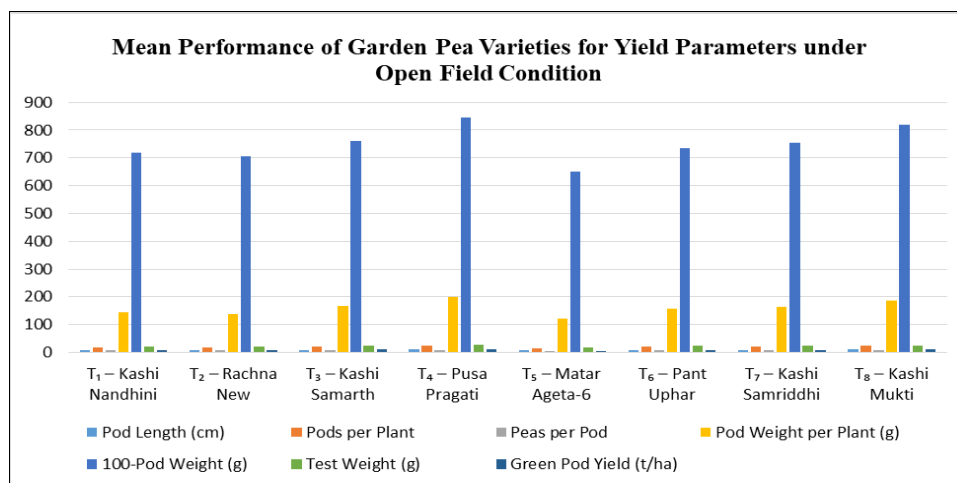


Fig 2: Mean Performance of Garden Pea Varieties for Yield Parameters under Open Field Condition

Bold values indicate the superior variety. Pusa Pragati produced the longest pods (10.60 cm), highest number of pods per plant (25.8), maximum peas per pod (8.6), highest pod weight per plant (198.7 g), and maximum green pod yield (12.40 t/ha). Kashi Mukti was the second-best performer. The number of

pods per plant showed strong positive association with overall yield, which is in line with earlier correlation studies.

Economic Analysis

Table 3: Economic Analysis of Garden Pea Varieties under Open Field Condition

Treatments	Green Pod Yield (t/ha)	Gross Return (₹/ha)	Cost of Cultivation (₹/ha)	Net Return (₹/ha)	Benefit-Cost Ratio
T ₁ - Kashi Nandhini	8.20	2,05,000	80,000	1,25,000	2.56
T ₂ - Rachna New	7.75	1,93,750	80,000	1,13,750	2.42
T ₃ - Kashi Samarth	9.85	2,46,250	80,000	1,66,250	3.08
T ₄ - Pusa Pragati	12.40	3,10,000	80,000	2,30,000	3.87
T ₅ - Matar Ageta-6	6.10	1,52,500	80,000	72,500	1.91
T ₆ - Pant Uphar	9.10	2,27,500	80,000	1,47,500	2.84
T ₇ - Kashi Samriddhi	9.60	2,40,000	80,000	1,60,000	3.00
T ₈ - Kashi Mukti	11.80	2,95,000	80,000	2,15,000	3.69

Pusa Pragati recorded the highest net return (₹2,30,000 ha⁻¹) and benefit-cost ratio (3.87), confirming its economic superiority.

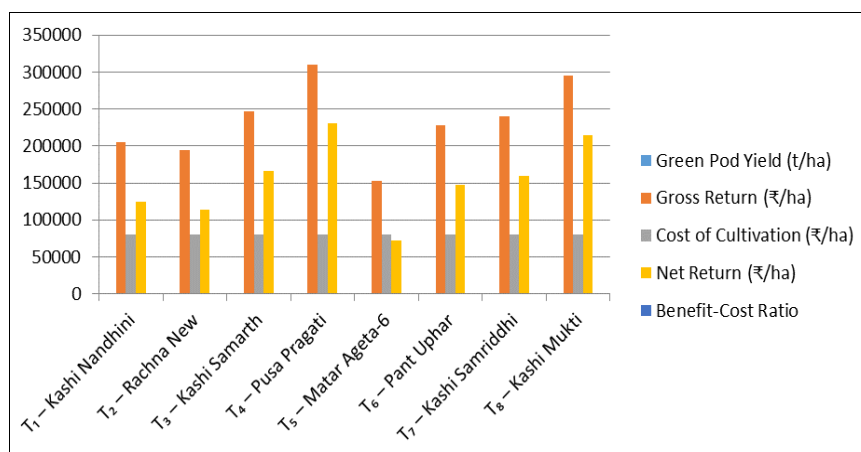


Fig 3: Economic Analysis of Garden Pea Varieties under Open Field Condition

Discussion: The superior performance of Pusa Pragati in growth parameters (plant height, branches, earliness) and yield attributes (pods per plant, pod length, green pod yield) can be attributed to its inherent genetic potential for vigorous vegetative growth and efficient pod setting under subtropical conditions of central Uttar Pradesh. These findings are consistent with Verma *et al.* (2025) [20], who reported Pusa Pragati and Kashi Samarth as promising for higher plant height (78-92 cm) and branches (5.8-6.9) under organic farming in central Uttar Pradesh. Similarly, Kanwar *et al.* (2020) [7] observed Pusa Pragati with the earliest first

flowering (34.73 days) among 30 genotypes, supporting the present earliness results.

The highest green pod yield of 12.40 t ha⁻¹ in Pusa Pragati aligns with earlier reports by Khichiet *al.* (2016) and Lal *et al.* (2022) [8, 12], who found high-yielding varieties producing 9.3-12.8 t ha⁻¹ in semi-arid and Malwa regions. The strong positive association between number of pods per plant and green pod yield observed in the present study matches the correlation results of Pandey *et al.* (2016), Kumar *et al.* (2018), and Singh *et al.* (2019) [9, 14, 17]. Kashi Mukti ranked second in both growth

and yield, corroborating the observations of Dutta and Majee (2021) and Luthra *et al.* (2024) on Kashi series varieties ^[5, 13].

The economic advantage of Pusa Pragati (B:C ratio 3.87) further strengthens its recommendation for commercial cultivation, as higher yield directly translated into better profitability. These results highlight the importance of region-specific variety evaluation, as emphasized in the review of literature by Chadha *et al.* (2015), Afreen *et al.* (2017), and Sharma *et al.* (2024) ^[1, 2, 16]. Overall, the study demonstrates that Pusa Pragati is the most suitable and economically viable variety for open-field cultivation in the Kanpur region of Uttar Pradesh.

References

1. Afreen S, *et al.* Genetic evaluation of garden pea (*Pisum sativum*) genotypes in the North Indian Gangetic Plain. *Vegetable Science*. 2017;44(1):120-125.
2. Bhutia ND, Saurabh. Assessment of garden pea (*Pisum sativum*) varieties under conventional and organic nutrient management in Patna. *Journal of Applied and Natural Science*. 2017;9(3):1450-1456.
3. Chadha S, *et al.* Evaluation of garden pea (*Pisum sativum*) genotypes under organic and conventional systems in Himachal Pradesh. *Indian Journal of Horticulture*. 2015;72(2):210-215.
4. Datta S, Das A. Varietal performance of garden pea (*Pisum sativum*) in West Bengal's terai region. *Journal of Crop and Weed*. 2018;14(2):88-93.
5. Dutta S, Majee D. Evaluation of organically grown garden pea (*Pisum sativum*) varieties in south Chhotanagpur plateau. *Current Horticulture*. 2021;9(1):42-47.
6. Heena, *et al.* Evaluation of French bean (*Phaseolus vulgaris*) genotypes in Karnataka's hill zone. *Legume Research*. 2017;40(4):630-635.
7. Kanwar R, *et al.* Assessment of 30 pea (*Pisum sativum*) genotypes for growth and yield traits. *Indian Journal of Agricultural Sciences*. 2020;90(5):940-945.
8. Khichi P, *et al.* Performance of garden pea (*Pisum sativum*) varieties in semi-arid Vidarbha. *Journal of Soils and Crops*. 2016;26(1):112-117.
9. Kumar A, *et al.* Evaluation of garden pea (*Pisum sativum*) varieties under conventional and organic conditions. *Vegetable Science*. 2018;45(2):185-190.
10. Kumar R, *et al.* Performance of 25 garden pea (*Pisum sativum*) genotypes in North Indian Gangetic plains. *Indian Journal of Horticulture*. 2021;78(3):275-281.
11. Kumar S, *et al.* Characterization of 150 vegetable pea (*Pisum sativum*) germplasm accessions. *Plant Genetic Resources*. 2024;22(1):34-42.
12. Lal S, *et al.* Performance of garden pea (*Pisum sativum*) varieties in Malwa region of Madhya Pradesh. *Journal of Pharmacognosy and Phytochemistry*. 2022;11(2):55-59.
13. Luthra SK, *et al.* Evaluation of pea (*Pisum sativum*) genotypes under Prayagraj conditions. *Legume Research*. 2024;47(3):410-416.
14. Pandey Y, *et al.* Correlation studies in garden pea (*Pisum sativum*). *Indian Journal of Horticulture*. 2016;73(4):520-525.
15. Panse VG, Sukhatme PV. *Statistical Methods for Agricultural Workers*. 4th ed. New Delhi: ICAR; 1985.
16. Sharma A, *et al.* Evaluation of 14 pea (*Pisum sativum*) genotypes under subtropical Punjab conditions. *Journal of Applied Horticulture*. 2024;26(2):130-135.
17. Singh R, *et al.* Correlation and path analysis in garden pea (*Pisum sativum*). *Legume Research*. 2019;42(5):615-620.
18. Singh S, *et al.* Assessment of garden pea (*Pisum sativum*) varieties under organic and conventional systems in Himachal Pradesh mid-hills. *Indian Journal of Horticulture*. 2022;79(1):64-70.
19. Tiwari SK, *et al.* Effect of sowing dates on vegetable pea (*Pisum sativum*) genotypes. *Vegetable Science*. 2014;41(2):160-164.
20. Verma A, *et al.* Performance of garden pea (*Pisum sativum*) varieties under organic farming in central Uttar Pradesh. *Current Horticulture*. 2025;13(1):18-23.