



ISSN Print: 2618-060X
 ISSN Online: 2618-0618
 NAAS Rating (2026): 5.20
 IJRA 2026; 9(10): 247-249
www.agronomyjournals.com
 Received: 04-08-2026
 Accepted: 21-09-2026
 Published: 06-10-2026

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Performance of low-ODAP *Lathyrus* varieties under different dates of sowing in Vertisols of Chhattisgarh plains

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DOI: <https://www.doi.org/10.33545/2618060X.2026.v9.i10d.6793>

ABSTRACT

The study entitled “Performance of low-ODAP *Lathyrus* varieties at different dates of sowing in Vertisols of Chhattisgarh plains” was conducted during the Rabi season of 2025–26 at the Agriculture Instructional-cum-Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The experimental soil was Vertisol with neutral reaction (pH 7.2), low nitrogen, medium phosphorus and high potassium. The experiment was laid out in a Factorial Randomized Complete Block Design with three replications, comprising five low-ODAP *Lathyrus* varieties, viz., RLS-3004-2, RLS-2022-4, Mahateora, Prateek and Ratan, and three dates of sowing, viz., 25 November, 05 December and 15 December. Among the varieties, RLS-3004-2 recorded the highest seed yield (1299 kg ha⁻¹), which was statistically comparable with RLS-2022-4 (1266 kg ha⁻¹). Regarding sowing dates, 25 November sowing recorded superior growth, yield attributes and seed yield (1229 kg ha⁻¹). Delayed sowing resulted in a progressive reduction in productivity. Results indicated that RLS-3004-2 with timely sowing on 25 November was the best treatment under Vertisols of the Chhattisgarh plains.

Keywords: *Lathyrus*, Low-ODAP varieties, vertisols, seed yield, stover yield, harvest index, seed index, Rabi season, Chhattisgarh plains

Introduction

Pulses are an important component of the Indian food system and constitute a major source of dietary protein, energy, minerals and vitamins. India is the world's largest producer and consumer of pulses. During 2025–26, pulses were cultivated on about 28.65 million ha, producing 27.41 million tonnes with an average productivity of 957 kg ha⁻¹ (Anonymous 2025). In addition to their nutritional importance, pulse crops contribute to sustainable agriculture through biological nitrogen fixation and efficient utilization of soil resources. They are particularly important in low-input and resource-constrained farming systems (Pamei *et al.*, 2020).

Lathyrus (*Lathyrus sativus* L.), commonly known as grass pea or *khesari*, is a climate-resilient pulse crop well adapted to drought, low soil fertility and moisture-stress conditions. It is an annual legume belonging to the family Fabaceae and tribe Viciae. Its seeds contain considerable amounts of protein, carbohydrates, oil and minerals, making it an important food and feed crop.

In India, lathyrus is predominantly grown during the rabi season, particularly under rice-based and rice-fallow cropping systems. The crop is well suited to residual soil moisture after rice harvest and can be cultivated with relatively low external inputs. In Chhattisgarh, lathyrus is commonly grown in rice-fallow areas under the utera or relay-cropping system. The crop has good adaptability to the Vertisols and limited-moisture conditions prevailing in the rice-based ecosystems of the state. However, its productivity remains comparatively low, highlighting the need for improved varieties and suitable agronomic management.

One of the most important factors influencing lathyrus productivity is the date of sowing. Sowing time determines the environmental conditions experienced by the crop during germination, vegetative growth, flowering and seed development. Timely sowing promotes proper crop establishment, root development, dry matter accumulation and reproductive growth, whereas delayed sowing may expose the crop to unfavorable temperature and moisture conditions, resulting in a shorter crop-growth period and reduced yield (Singh, 1998; Rao *et al.*, 2005b). Therefore, identification of an optimum sowing window is essential for achieving higher productivity.

The development of low-ODAP lathyrus varieties such as RLS-3004-2, RLS-2022-4, Mahateora, Prateek and Ratan has provided an opportunity to enhance the nutritional safety, productivity and acceptability of the crop. These varieties differ in maturity, yield potential and adaptability under rice-based cropping systems. However, limited information is available on their relative performance under different sowing dates in the Vertisols of Chhattisgarh plains.

Materials and Methods

A field experiment was conducted during the Rabi season of 2025–26 at the Agriculture Instructional-cum-Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The experiment was laid out in Factorial Randomized Block Design (FRBD) with three replications comprising total fifteen treatment combinations. The treatment comprised of five varieties and three dates of sowing. The treatment combinations were T₁: RLS-3004-2 with 25th November sowing; T₂: RLS-3004-2 with 05th December sowing; T₃: RLS-3004-2 with 15th December sowing; T₄: RLS-2022-4 with 25th November sowing; T₅: RLS-2022-4 with 05th December sowing; T₆: RLS-2022-4 with 15th December sowing; T₇: Mahateora with 25th November sowing; T₈: Mahateora with 05th December sowing; T₉: Mahateora with 15th December sowing; T₁₀: Prateek with 25th November sowing; T₁₁: Prateek with 05th December sowing; T₁₂: Prateek with 15th December sowing; T₁₃: Ratan with 25th November sowing; T₁₄: Ratan with 05th December sowing and T₁₅: Ratan with 15th December sowing. The experiment site was geographically situated at 21°16' N latitude and 81°36' E longitude, with an altitude of 298.15 m above mean sea level. The crop was sown from 25th November 2025 to 15th December 2025 and harvested up to 18th March 2026. The experimental site represented the Vertisols of Chhattisgarh plains under a rice-based cropping system.

Results and Discussion

Yield attributes

The significantly highest number of pods plant⁻¹ (23.1) and number of seed plant⁻¹ (88.9) were recorded under the variety of V₁ (RLS-3004-2) which was at par with V₂ (RLS-2022-4). Regarding the sowing date significantly higher number of pods plant⁻¹ (22) and number of seeds plant⁻¹ (86.4) was noted under S₁ (25th November) as compared to other sowing dates. The highest number of pods plant⁻¹ on a timely sowing date could be the result of more branches and flowers plant⁻¹ with sufficient soil moisture and nutrient availability. Similar observations have been reported by Talukder *et al.* (2012), Sayar and Han (2015) and Bubolz *et al.* (2026).

The number of seeds pod⁻¹ was no significant difference among all varieties. The result revealed that variety of lathyrus, V₁ (RLS-3004-2) had the numerically maximum number of seeds pod⁻¹ (3.78). The maximum numerical value of the number of seeds pod⁻¹ (3.79) was

recorded on the timely date of sowing, which is S₁ (25th November). When seeded on time, the crop matured for an average of 108 days. As the seeding was delayed, the crop duration for later sown dates gradually decreased. When compared to later sowing dates, a longer crop duration and more days for the reproductive phase have resulted in the appearance of more seeds pod⁻¹. The trials show that sowing lathyrus on time produced more seeds pod⁻¹. Similar observations have been reported by Kour and Agarwal (2018) Tenikecier and (2020).

The significantly highest seed index (6.92 g) is recorded Out of all the lathyrus varieties, V₁ (RLS-3004-2). The data makes it clearly apparent that the seed index was not affected by the date of sowing. Still, sown on S₁ (25th November) yielded the numerically highest seed index (6.35 g). On S₃ (15th December). Similar observations have been reported by Talukder *et al.* (2012) and Talukdar (2019).

Seed yield, stover yield and harvest index

The significantly highest seed yield (1299 kg ha⁻¹) and stover yield (2503 kg ha⁻¹) was recorded under varieties of lathyrus V₁ (RLS-3004-2). The variety V₁ (RLS-3004-2) may have a higher seed yield since there are more pods plant⁻¹, seeds pod⁻¹, and seeds plant⁻¹. Similar observations were reported by Ghosh and Khan (2018) and Rafaat *et al.* (2021). As regard to date of sowing on S₁ (25th November) recorded significantly the highest seed yield (1229 kg ha⁻¹) and stover yield (2336 kg ha⁻¹). The dates of sowing were all very different from others, and the order of descent for seed yield was S₁ (25th November), S₂ (05th December) and S₃ (15th December). The outcome of crop growth and yield-attributing traits is its seed yield. The superiority of growth characteristics, such as plant height, CGR, RGR, and dry matter accumulation, and yield attributes, such as number of pods plant⁻¹, number of seeds pod⁻¹ and seed index as already discussed, may be the cause of the higher seed yield and stover yield produced under the sowing date of S₁ (25th November). Similar observations were reported by Larbi *et al.* (2010) and Sayar and Han (2015).

The harvest index (%) was no significant variation in the harvest index (%) caused by the varieties, the date of sowing, or their combination. Among the variety V₁ (RLS-3004-2) recorded highest harvest index (34.11%). Similar findings have been reported by Sayar and Han (2015). As regards to date of sowing S₁ (25th November) had the highest harvest index (34.57%). Similar findings have been reported by Hanbury *et al.* (2000), Larbi *et al.* (2010) and Rafaat *et al.* (2021).

Table 1. Yield attributing characters, Seed yield, Stover yield and Harvest index of lathyrus as affected by varieties and date of sowing at different duration

Treatment	Number of pods plant ⁻¹	Number of seeds pod ⁻¹	Number of seeds plant ⁻¹	Seed index (g)	Seed yield (kg ha ⁻¹)	Stover yield (kg ha ⁻¹)	Harvest index (%)
Varieties							
V ₁ -RLS-3004-2	23.1	3.78	88.9	6.92	1299	2503	34.11
V ₂ -RLS-2022-4	22.6	3.73	86.7	6.64	1266	2452	34.08
V ₃ -Mahateora	20.1	3.71	76.0	6.12	1020	1979	33.97
V ₄ -Prateek	18.4	3.62	67.4	5.98	918	1795	33.83
V ₅ -Ratan	17.0	3.60	62.5	5.74	823	1582	33.79
SEm±	0.60	0.07	2.53	0.40	33	66	0.66
CD (P = 0.05)	1.73	NS	7.32	0.13	95	190	NS
Date of sowing							
S ₁ -25 th November 2025	22.4	3.79	86.4	6.35	1229	2336	34.57
S ₂ -05 th December 2025	20.1	3.69	75.8	6.29	1111	2154	34.01
S ₃ -15 th December 2025	18.2	3.61	66.8	6.20	855	1696	33.28
SEm±	0.46	0.06	1.96	0.07	25	51	0.51
CD (P = 0.05)	1.34	NS	5.67	NS	73	147	NS

Conclusion

Number of pods plant⁻¹ was found to be significantly affected by lathyrus varieties, date of sowing and their interaction. Variety V₁ (RLS-3004-2) recorded significantly higher number of pods plant⁻¹ (23) which was at par with V₂ (RLS-2022-4). However, the date of sowing S₁ (25th November) produced the highest number of pods plant⁻¹ (22) which was significantly reduced as sowing was delayed. Number of number seeds plant⁻¹ also followed the similar trend. Number of seeds pod⁻¹ was unaffected with varieties and date of sowing. As regard to seed index, variety V₁ (RLS-3004-2) recorded significantly highest seed index (6.92 g). However, in case of date of sowing the highest seed index was significantly recorded on S₁ (25th November) (6.35 g). The varieties and date of sowing had a significant effect on seed yield. Variety V₁ (RLS-3004-2) recorded significantly highest seed yield (1299 kg ha⁻¹), which was at par with variety V₂ (RLS-2022-4) with seed yield (1266 kg ha⁻¹). The effect of date of sowing was more pronounced and highest seed yield (1229 kg ha⁻¹) was obtained under first date of sowing *i.e.* S₁ (25th November). Stover yield was affected by varieties, date of sowing and interaction between date of sowing and varieties. *Lathyrus* variety V₁ (RLS-3004-2) produced significantly highest stover yield (2503 kg ha⁻¹). However, it was found comparable with variety V₂ (RLS-2022-4) which have stover yield (2452 kg ha⁻¹). The date of sowing on S₁ (25th November) recorded significantly highest stover yield (2336 kg ha⁻¹). As regard to harvest index, no significant difference was noticed due to varieties and date of sowing. Among the varieties, V₁ (RLS-3004-2) recorded highest (34.11 %). Similarly, highest harvest index (34.57 %) was noted under S₁ (25th November) date of sowing.

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How to cite this article: Chandrakar DK, Sahu TK, Painkra JS. Performance of low-ODAP *Lathyrus* varieties under different dates of sowing in Vertisols of Chhattisgarh plains. *International Journal of Research in Agronomy.* 2026;9(10):247-249. doi: <https://www.doi.org/10.33545/2618060X.2026.v9.i10d.6793>