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Effect of different time of sowing on growth and yield of pea (*Pisum sativum* L.) Var. Rachna

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Abstract

A field experiment entitled “Effect of different time of sowing on growth and yield of pea (*Pisum sativum* L.)” was conducted during the Rabi season to determine the optimum sowing date for maximizing productivity in the Gwalior region. Different sowing dates from Rabi season, 2024-25 were evaluated in a randomized block design with three replications. Growth attributes such as plant height, branches per plant, leaf area index, and dry matter accumulation increased steadily with crop age and were significantly higher in crops sown during the last fortnight of T₃ and T₄. Yield attributes including pods per plant, seeds per pod, and pod weight were also maximized under T₄, which produced the highest grain yield T₄ (2672.31) followed by T₅ (2081.67), stover yield T₄ (2026.93), followed by T₃ (1929.06) and biological yield T₄ (4699.24), followed by T₃ (4465.38). Delayed sowings beyond mid-November significantly reduced growth and yield performance.

Keywords: Pea (*Pisum sativum*), varieties, sowing time, grain yield, and growth attributes

Introduction

Pea (*Pisum sativum* L.) is one of the most important cool-season legumes in India, valued for its nutritional, economic, and ecological roles. It provides 20-25% protein, dietary fiber, essential vitamins (A, B-complex, C), and minerals such as iron, calcium, and magnesium. In addition to its food value, pea contains flavonoids and polyphenols that contribute to human health by improving digestion, heart health, and immunity. With a low glycemic index, it is also recommended for managing diabetes and obesity. Besides its dietary significance, pea plays a vital role in sustainable agriculture by enriching soil fertility through biological nitrogen fixation, reducing the dependence on synthetic fertilizers, and supporting crop diversification. The major growing states are Uttar Pradesh, Madhya Pradesh, Bihar, and Punjab. In Madhya Pradesh, pea is an important Rabi pulse grown mainly under irrigated or residual moisture conditions after Kharif crops. The Gwalior region, located in the Gird agro-climatic zone, provides favorable conditions for winter pea cultivation due to fertile black soils and moderate winter temperatures. The crop thrives best on loamy to clay loam soils with good drainage. Early sowing can lead to excessive vegetative growth and pest incidence, whereas delayed sowing shortens crop duration and exposes the crop to terminal heat stress, reducing yield and quality (Singh *et al.*, 2018; Yadav *et al.*, 2017)^[12, 19]. In the face of increasing climatic variability, the identification of an optimum sowing window becomes crucial. Despite the importance of sowing time, limited region-specific research is available for central India, particularly the Gwalior region. Climatic extremes such as terminal heat, frost, and irregular rainfall, coupled with pest and disease pressure, often reduce productivity by 20-30%. Therefore, systematic evaluation of sowing dates is needed to identify the most suitable window for maximizing growth, yield, and profitability. In this context, the present study was undertaken to assess the effect of different sowing dates on the growth, yield attributes, and economics of pea in the Gwalior region, with the aim of generating region-specific recommendations for sustainable intensification.

Materials and Methods

The present field experiment was conducted during the Rabi season of 2024-25 at the agriculture research and Farm development centre, Sakatpura, School of Agriculture Science, Vikrant University, Gwalior (Madhya Pradesh), to study the effect of different

sowing dates on the growth and yield of pea (*Pisum sativum* L.). The experimental site is geographically situated at 26.21°N latitude and 78.18°E longitude with an elevation of 211 m above mean sea level, falling under the Gird agro-climatic zone of Madhya Pradesh. The climate of the region is subtropical, characterized by hot summers, a humid monsoon season, and cold winters with occasional frost, while the experimental soil was sandy loam, slightly alkaline in reaction, low in available nitrogen, medium in phosphorus, and rich in potassium. The field experiment was laid out in a Randomized Block Design (RBD) with three replications and eight sowing dates as treatments (7th October, 14th October, 21st October, 28th October, 4th November, 11th November, 18th November, and 25th November). The pea variety 'Rachna,' recommended for the region, was used with a seed rate of 60 kg ha⁻¹, sown manually in rows spaced at 30 × 10 cm and covered with light planking. Fertilizer application was carried out uniformly across treatments at the rate of 20:60:40 kg N:P₂O₅:K₂O ha⁻¹ as basal dose, with nitrogen supplied through urea, phosphorus through single superphosphate, and potassium through muriate of potash. Standard cultural practices were followed, including one hand weeding at 25-30 DAS and need-based plant protection measures against aphids and diseases such as white rust and Alternaria blight, while irrigation was scheduled at pre-flowering, pod formation, and grain filling stages as per moisture requirement. Growth attributes were recorded at periodic intervals, including plant height (cm), number of branches per plant, leaf area index (LAI) calculated by the method of Watson (1947) [18], and dry matter accumulation (g m⁻²) determined by oven-drying samples collected at 30, 60, 90 DAS, and at harvest. Yield attributes such as the number of pods per plant, seeds per pod, and 1000-seed weight (seed index) were recorded from five randomly selected plants per plot, while seed yield (kg ha⁻¹) was obtained from the net plot produce after threshing and adjusting to 8% moisture content, stover yield was derived from total biomass after subtracting grain yield, and biological yield was calculated as the sum of seed and stover yields. Harvest index (%) was determined as the ratio of economic yield to biological yield, expressed in percentage. The data recorded on growth and yield parameters were subjected to statistical analysis using the Analysis of Variance (ANOVA) technique as suggested by Panse and Sukhatme (1967) under the

Randomized Block Design framework, with treatment means compared using the Critical Difference (CD) test at a 5% probability level to ascertain the level of significance. Graphical and tabular presentations were also prepared for effective interpretation of results.

Results and Discussion

The results revealed that dates of sowing had a significant influence on the initial plant population at 15 DAS. The highest plant population was recorded with sowing on 4th November (10.00 plants/m²), which was statistically at par with 11th November (9.95 plants/m²) and 18th November (9.81 plants/m²). The lowest plant stand was observed in the earliest sowing on 7th October (9.25 plants/m²). The relatively higher plant population in later sowings could be attributed to favorable soil moisture and optimum temperature conditions during germination and seedling establishment, which enhanced seed germination and early vigor. In contrast, relatively higher soil temperatures during early October sowing might have adversely affected germination and crop stand. Similar findings were also reported by Singh *et al.* (2019) [18], who observed that mid-November sowing in pea resulted in better plant population due to congenial weather conditions during germination.

Plant height of pea increased progressively with crop age and was significantly influenced by sowing dates at all growth stages. At 30 DAS, maximum plant height T₄ (13.55) was recorded, followed by T₃ (13.21) and T₈ (11.97). At 60 and 90 DAS, the tallest plants T₄ (44.08) and T₄ (67.83), were consistently obtained from 28th October sowing, followed by 21st October, whereas the shortest plants T₈ (27.75) and (42.71) were recorded. At harvest, sowing on 28th October again registered the tallest plants T₄ (81.41), followed by T₃ (75.97) and T₅ (59.72) was observed. The superiority of mid to late October sowings in terms of plant height may be attributed to favorable climatic conditions, particularly optimum temperature and day length, which promoted cell division and elongation. In contrast, delayed sowing beyond November subjected the crop to lower temperatures and shorter photoperiods, thereby reducing vegetative growth. These findings are in agreement with Thapa *et al.* (2017) [16], who also reported taller plants in October sowings of pea compared to late November sowings.

Table 1: Effect of different time of sowing on growth and yield of pea (*Pisumsativum* L.) Var. Rachna.

Treatment	Plant population at initial stage (15 DAS)	Plant height (cm.)			
		30 DAS	60 DAS	90 DAS	At harvesting stage
T ₁	9.25	13.11	35.63	54.8	63.02
T ₂	9.30	13.19	36.73	56.51	65.55
T ₃	9.46	13.21	41.95	64.38	75.97
T ₄	9.58	13.55	44.08	67.83	81.41
T ₅	10.00	12.95	34.34	52.85	59.72
T ₆	9.95	12.27	30.40	46.78	50.99
T ₇	9.81	12.07	29.37	45.19	48.36
T ₈	9.70	11.97	27.75	42.71	44.84
S. Em±	0.09	0.11	1.73	2.52	2.96
C.D.(P=0.05)	0.27	0.35	5.15	7.51	8.79

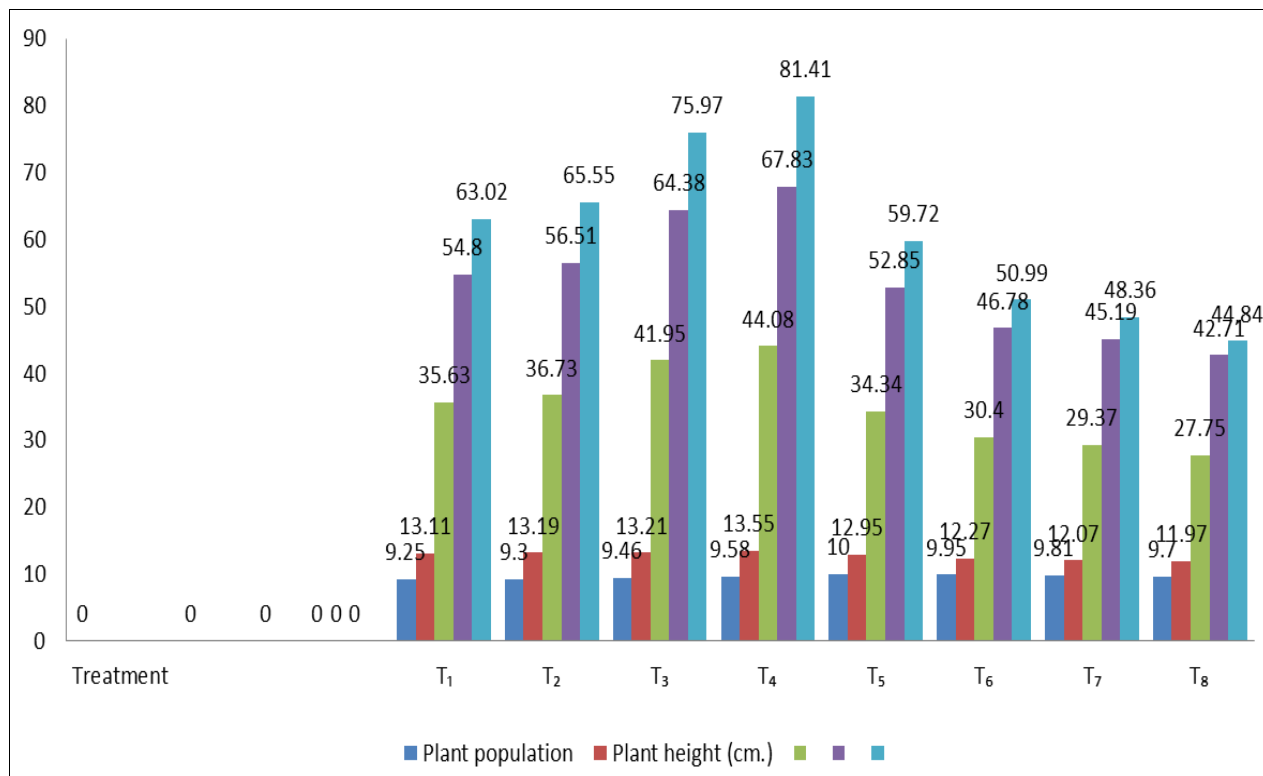


Fig 1: Effect of different time of sowing on growth and yield of pea (*Pisum sativum* L.) Var. Rachna

Dry matter accumulation per plant increased progressively with crop age and was significantly influenced by sowing dates at all stages of growth (Table 2). At 30 DAS, the maximum dry matter accumulation T₄ (20.94), followed by T₃ (20.80) and T₅ (18.99) was observed. A similar trend continued at later stages, with 28th October sowing producing the highest dry matter at 60 DAS T₄ (54.22), 90 DAS T₄ (71.01), and at harvest T₄ (78.11 g), followed by T₃ (72.90) and T₅ (57.30). In contrast, late November sowings accumulated significantly less biomass, with the minimum values recorded in T₈ (34.13), (39.12), and (43.03) at 60, 90

DAS, and harvest, respectively). The superiority of mid to late October sowings in terms of biomass production may be attributed to favorable weather conditions that supported greater photosynthetic activity, enhanced leaf area development, and longer vegetative duration. Delayed sowing, however, curtailed the vegetative period and exposed the crop to terminal cold stress, resulting in reduced biomass accumulation. These findings corroborate the results of Verma *et al.* (2020) [17], who also reported that optimum sowing dates in pea ensured greater biomass accumulation.

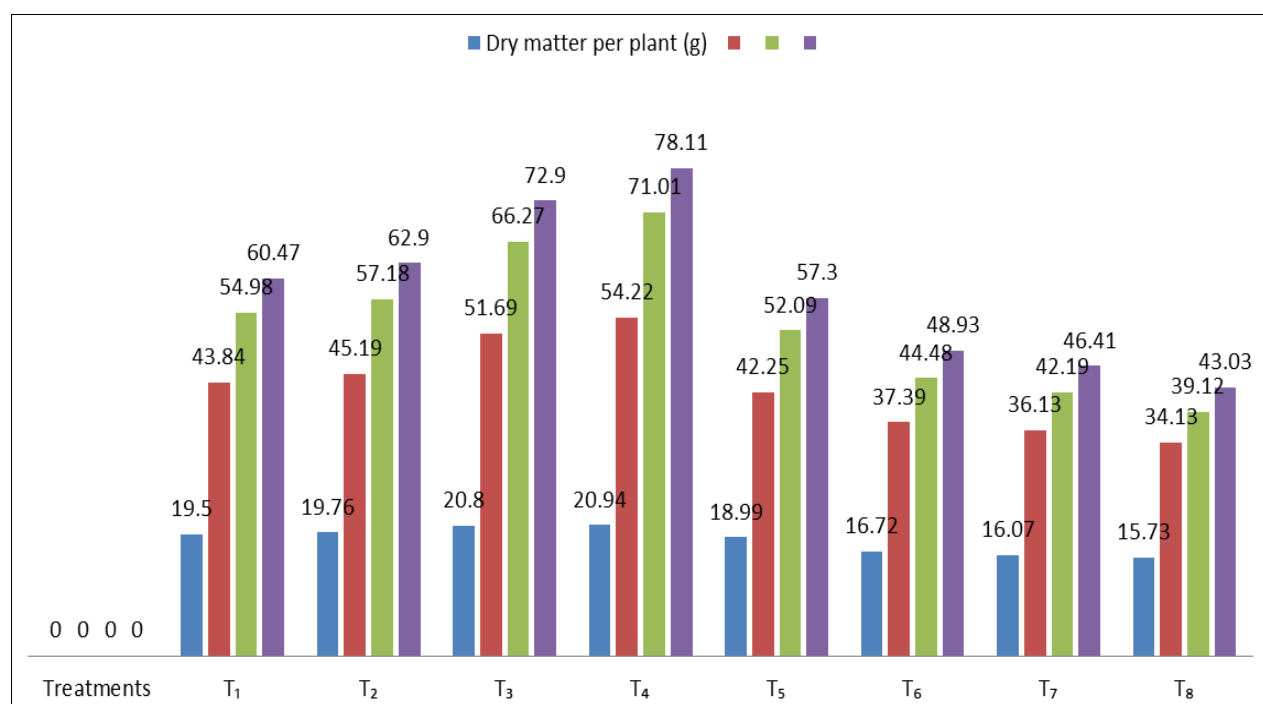


Fig 2: Dry matter per plant (g) at various stages of pea as influenced by different dates of sowing

Table 2: Dry matter per plant (g) at various stages of pea as influenced by different dates of sowing

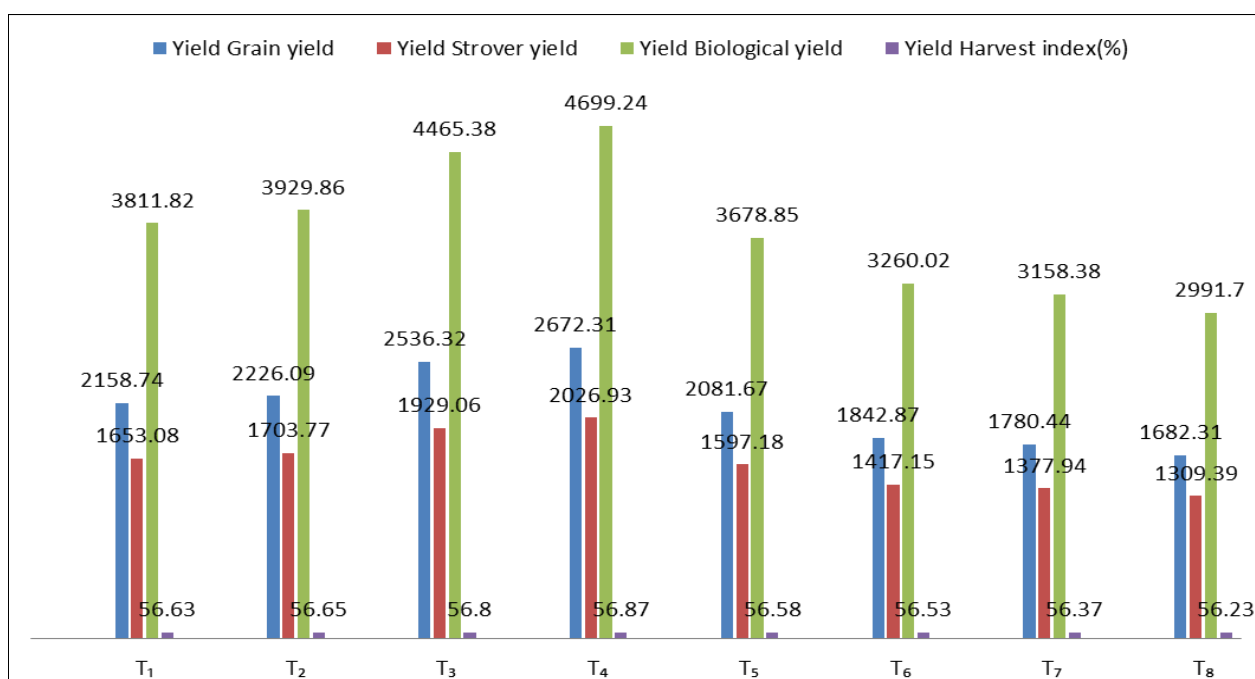
Treatments	Dry matter per plant (g)			
	30DAS	60 DAS	90 DAS	At harvest stage
T ₁	19.50	43.84	54.98	60.47
T ₂	19.76	45.19	57.18	62.90
T ₃	20.80	51.69	66.27	72.90
T ₄	20.94	54.22	71.01	78.11
T ₅	18.99	42.25	52.09	57.30
T ₆	16.72	37.39	44.48	48.93
T ₇	16.07	36.13	42.19	46.41
T ₈	15.73	34.13	39.12	43.03
S. Em±	0.86	2.20	2.57	2.83
C.D.(P=0.05)	2.57	6.55	7.67	8.43

The yield of grain yield, stover yield, and biological yield of pea were significantly influenced by sowing dates, whereas harvest index remained relatively stable across treatments (Table no 3). The highest grain yield recorded was at T₄ (2672.31), followed by T₃ (2536.32) and T₅ (2081.67), stover yield T₄ (2026.93) followed by T₃ (1929.06) and T₅ (1597.18), and biological yield T₄ (4699.24) followed by T₃ (4465.38) and T₅ (3678.85). Early October sowings produced moderate yields, while the lowest grain yield T₈ (1682.31), stover yield (1309.39), and biological yield (2991.70) were observed. Harvest index values remained almost constant T₄ (56.87) across sowing dates, indicating

proportional partitioning between grain and total biomass. The higher yields recorded in mid to late October sowings may be attributed to better crop growth, higher branching, increased leaf area index, greater dry matter accumulation, and improved yield attributes under favorable climatic conditions. In contrast, delayed sowings encountered suboptimal temperature and shorter growing periods, which restricted biomass production and yield potential. These findings are in close agreement with Meena *et al.* (2018), who also reported that mid-October sowing maximized pea yield under north Indian conditions.

Table 3: Yield of pea as influenced by different dates of sowing

Treatment	Yield			
	Grain yield	Strover yield	Biological yield	Harvest index (%)
T ₁	2158.74	1653.08	3811.82	56.63
T ₂	2226.09	1703.77	3929.86	56.65
T ₃	2536.32	1929.06	4465.38	56.80
T ₄	2672.31	2026.93	4699.24	56.87
T ₅	2081.67	1597.18	3678.85	56.58
T ₆	1842.87	1417.15	3260.02	56.53
T ₇	1780.44	1377.94	3158.38	56.37
T ₈	1682.31	1309.39	2991.7	56.23
S. Em±	99.72	77.9	177.62	--
C.D.(P=0.05)	296.31	231.48	527.79	--

**Fig 3:** Yield of pea as influenced by different dates of sowing

Conclusion

It can be concluded that appropriate the present investigation demonstrated that sowing time had a significant impact on the growth and yield performance of pea. Growth parameters such as plant population, plant height, branching, leaf area index, and dry matter accumulation were maximized in sowings during the last fortnight of October, particularly on 28th October, which also recorded the highest grain yield T₄ (2672.31) and biological yields along with maximum profitability T₄ (2026.93). In contrast, delayed sowings beyond the first week of November resulted in reduced growth, yield, and economic returns due to suboptimal temperature and shorter crop duration conditions of central India at Gwalior, Madhya Pradesh.

References

- Adetula OA, Denton OA. The performance of local selected okra lines with export potentials. *Niger J Hortic Sci.* 2003;8:73-5. DOI: 10.4314/njhs.v8i1.3366.
- Adetuyi FO, Osagie AU, Adekunle AT. Effect of postharvest storage techniques on the nutritional properties of Benin indigenous okra *Abelmoschus esculentus* (L) Moench. *Pak J Nutr.* 2008;7:652-7. DOI: 10.3923/pjn.2008.652.657.
- Ahirwar CS, Bahadur V, Praksh V. Genetic variability heritability and correlation studies in tomato genotypes. *Int J Agric Sci.* 2013 Jan;9(1):168-71.
- Ahirwar CS, Hussain A. Effect of vermicompost on growth, yield and quality of vegetable crops. *Int J Appl Pure Sci Agric.* 2015;1(8):49-56.
- Ahirwar CS, Singh AP, Nath R, Verty P. Assessments effect of nitrogen and phosphorus on the phenological and fruit characters of okra (*Abelmoschus esculentus* L.). *Int J Curr Microbiol App Sci.* 2021;10:1918-25. DOI: 10.20546/ijcmas.2021.1002.229.
- Ahirwar CS, Singh AP, Nath R, Verty P. Assessments effect of nitrogen and phosphorus on the phenological and fruit characters of okra (*Abelmoschus esculentus* L.). *Int J Curr Microbiol App Sci.* 2021;10:1918-25.
- Jat MK, Ahirwar CS, Vikram B, Parsad VM. Studies of genetic diversification and correlation coefficient of different genotypes in onion (*Allium cepa* L.). *Ann Hortic.* 2014;7(2):193-6.
- Ahirwar CS, Singh DK. SDS-PAGE based protein profiling and diversity assessment of indigenous genotypes of cucumber. *Indian J Hortic.* 2019;76(4):683-90.
- Ahirwar CS, Singh DK, Kushwaha ML. Assessment of genetic divergence in cucumber (*Cucumis sativus* L.) germplasm through clustering and principal component analysis. *J Pharmacogn Phytochem.* 2017;6(5):804-7.
- Ahirwar CS, Singh DK. Assessment of genetic variability in cucumber (*Cucumis sativus* L.). *Int J Curr Microbiol App Sci.* 2018;7(03):813-22.
- Kumar R, Singh P, Yadav S. Effect of sowing dates on growth and yield of pea (*Pisum sativum* L.). *Int J Curr Microbiol App Sci.* 2019;8(2):1234-41.
- Meena RS, Singh A, Shivay YS. Influence of sowing dates on productivity and profitability of field pea (*Pisum sativum* L.) under north Indian conditions. *Legume Res.* 2018;41(5):732-7.
- Panse VG, Sukhatme PV. Statistical methods for agricultural workers. 2nd ed. New Delhi: ICAR; 1967.
- Singh R, Chauhan VB, Sharma N. Effect of sowing time on phenology and yield of pea (*Pisum sativum* L.). *J Pharmacogn Phytochem.* 2018;7(5):222-5.
- Singh S, Kumar A, Patel R. Influence of sowing dates on plant establishment and yield attributes of pea (*Pisum sativum* L.). *J AgriSearch.* 2019;6(4):210-4.
- Thapa U, Bhat TA, Sofi JA. Response of pea (*Pisum sativum* L.) to different sowing dates under temperate conditions. *Int J Pure Appl Biosci.* 2017;5(1):550-5.
- Verma A, Singh V, Mehta RS. Dry matter accumulation and yield of pea as influenced by sowing windows. *J Pharmacogn Phytochem.* 2020;9(2):123-8.
- Watson DJ. Comparative physiological studies on the growth of field crops: I. Variation in net assimilation rate and leaf area between species and varieties, and within and between years. *Ann Bot.* 1947;11(1):41-76.
- Yadav RK, Singh S, Meena RS. Effect of different sowing dates on growth and yield of pea (*Pisum sativum* L.). *Int J Curr Microbiol App Sci.* 2017;6(7):2158-65.