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Impact of biodynamic manure and panchgavya on growth and yield of wheat (*Triticum aestivum* L.)

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Abstract
A field experiment was conducted during the Rabi season of 2025 at the Research Farm of Vivekananda Global University, Jaipur, to evaluate the effect of biodynamic manure and Panchgavya on growth, yield and quality attributes of wheat (*Triticum aestivum* L.). The experiment was laid out in a randomized block design with twelve treatments and three replications. Treatments consisted of BD-500, BD-501 and Panchgavya applied individually and in combinations at tillering and flowering stages. Results revealed that application of BD-500 @ 75 g ha^{-1} combined with Panchgavya 3% spray at tillering and flowering (T9) significantly improved growth parameters, yield attributes, nutrient uptake and quality characteristics of wheat. The treatment recorded the maximum plant height (81.77 cm), dry matter accumulation (76.98 g plant^{-1}), effective tillers (6.18 plant^{-1}), spikelets ear^{-1} (17.78), grains ear^{-1} (37.36) and ear length (10.33 cm). The study indicated that integrated application of BD-500 and Panchgavya improved productivity and profitability of wheat under organic farming.

Keywords: Biodynamic manure, BD-500, Panchgavya, organic farming, wheat, yield, nutrient uptake

Introduction
Wheat (*Triticum aestivum L.*) is one of the most important cereal crops and serves as a staple food for a large proportion of the world population. Owing to its wider adaptability and high productivity, wheat is often referred to as the "King of Cereals". In India, wheat occupies about 31.23 million hectares with a production of 112.92 million tonnes and an average productivity of 3615 kg ha ¹ (Anonymous, 2024). Wheat contributes significantly to food and ⁻ nutritional security and plays a vital role in the agricultural economy of the country. Continuous dependence on chemical fertilizers has resulted in nutrient imbalance, deterioration of soil health and reduction in soil biological activity, thereby posing a threat to sustainable crop production (Sharma *et al.*, 2017) [53]. In recent years, increasing concern over environmental degradation and the demand for safe food have renewed interest in organic farming and the use of eco-friendly nutrient sources (Jat *et al.*, 2018) [29]. Panchgavya and biodynamic preparations are important components of organic farming systems and are rich sources of beneficial microorganisms, macro- and micronutrients, vitamins, enzymes and plant growth regulators (Pagar *et al.*, 2016) [39]. Panchgavya contains naturally occurring growth-promoting substances such as auxins, gibberellins and cytokinins, which enhance physiological activities and improve crop growth and productivity (Javiya *et al.*, 2019) [30]. Biodynamic preparations such as BD-500 and BD-501 have been reported to improve soil microbial activity, nutrient availability and crop performance under organic production systems (Jat *et al.*, 2018) [29].

Materials and methods
The experiment was conducted during Rabi 2025-26 at the Research Farm of Vivekananda Global University, Jaipur. The soil was loamy sand with low organic carbon (0.19%), low available nitrogen (274.46 kg ha ¹), medium phosphorus (21.68 kg ha ¹) and high potassium (329.76 kg ha ¹). The experiment was laid out in Randomized Block Design with three ⁻ replications and twelve treatments. Wheat variety Raj 4238 was sown at 20 cm row spacing using a seed rate of 100 kg ha ¹ .Treatment T9 consisted of BD-500 @ 75 g ha ¹ combined with Panchgavya 3% spray at tillering and flowering stages and proved superior over other treatments. Observations on plant height, dry matter accumulation, effective tillers, spike length, grains ear ¹, test weight, grain yield, straw yield, nutrient uptake, protein content and economics were ⁻ recorded. Statistical analysis was carried out following the procedures described by Panse and Sukhatme (1985) [40].

Result and discussion

Growth parameters

Application of biodynamic manure and Panchgavya significantly influenced the growth parameters of wheat. Plant height at 30 DAS was not significantly affected by various treatments; however, significant differences were observed at 60 DAS, 90 DAS and at harvest. The maximum plant height was recorded under treatment T_9 [BD-500 @ 75 g ha $^{-1}$ + Panchgavya @ 3% spray at tillering and flowering], which produced plant heights of 58.57 cm, 81.01 cm and 81.77 cm at 60 DAS, 90 DAS and harvest, respectively . Similarly, dry matter accumulation was also significantly increased under T_9, recording 13.69, 66.75 and 76.98 g plant^{-1} at 60 DAS, 90 DAS and harvest, respectively. The increase in plant height and dry matter accumulation might be attributed to the continuous supply of nutrients, enhanced microbial activity and the presence of growth-promoting substances in Panchgavya and biodynamic preparations. These organic formulations improve nutrient mineralization and facilitate better translocation of photosynthates, resulting in vigorous crop growth. Enhanced root development and improved nutrient uptake under the combined application of BD-500 and Panchgavya further contributed to greater biomass accumulation. The present findings are in close conformity with those reported by Pagar *et al.* (2016) [39], who observed significant improvement in growth parameters of wheat due to Panchgavya application. Similar results were also reported by Kumar *et al.* (2016) [32], Sharma *et al.* (2017) [53], Jat *et al.* (2018) [29], Javiya *et al.* (2019) [30], Praneeth *et al.* (2021) [46], Aher *et al.* (2022) [1], Chaturvedi *et al.* (2023) [15], Golmei and Singh (2024) [24], and Nandeha *et al.* (2024) [36], who reported that integrated application of bio-enhancers and organic formulations significantly increased plant height and dry matter production in cereal crops .

Yield attributes and yield

The yield attributes and yield of wheat were significantly affected by the application of biodynamic manure and Panchgavya. Treatment T_9 (BD-500 @ 75 g ha $^{-1}$ + Panchgavya 3% spray at tillering and flowering) recorded the highest number of effective tillers (6.18 plant $^{-1}$), spikelets ear^{-1} (17.78), grains ear^{-1} (37.36) and ear length (10.33 cm) over control. The maximum test weight (45.97 g) was also recorded under T_9, although the differences among treatments were statistically non-significant. Significantly higher grain yield (3408 kg ha $^{-1}$), straw yield (4425 kg ha $^{-1}$) and biological yield (7835 kg ha $^{-1}$) were obtained under treatment T_9 compared to control . The increase in grain and straw yields may be attributed to improved vegetative growth and superior yield attributes, which enhanced the source-sink relationship and facilitated greater translocation of photosynthates towards developing grains. The combined application of biodynamic manure and Panchgavya ensured a continuous supply of nutrients and growth regulators, which promoted efficient pollination and grain filling. Increased biomass accumulation and improved nutrient availability, particularly nitrogen and phosphorus, resulted in enhanced reproductive growth and higher productivity. Moreover, the synergistic effect of microbial populations, macro- and micronutrients and naturally occurring plant growth substances present in Panchgavya and biodynamic preparations contributed to increased yield potential.

These findings corroborate the reports of Chandrakala (2008) [14], Birkhofer *et al.* (2008) [6], Joergensen *et al.* (2010) [31], Ngosong *et al.* (2010) and Reeve *et al.* (2010) [48], who demonstrated the positive effects of biodynamic preparations on crop growth and yield. Similar results were also reported by Kumar *et al.* (2016) [32], Sharma *et al.* (2017) [53], Jat *et al.* (2018) [29], Thakur (2018) [58], Javiya *et al.* (2019) [30], Patel *et al.* (2021) [41], Praneeth *et al.* (2021) [46], Aher *et al.* (2022) [1], Chaturvedi *et al.* (2023) [15], Golmei and Singh (2024) [24] and Nandeha *et al.* (2024) [36], who observed higher yield attributes and grain yield with integrated application of organic bio-enhancers and Panchgavya in wheat and other cereal crops .

Table 1: Effect of biodynamic manure and panchgavya on growth of wheat

Treatments	Plant population		Plant height (cm)				Dry matter accumulation (g plant-1)				CGR (g m-2 day-1)		RGR (g g-1day-1)	
	20 DAS	At harvest	30 DAS	60 DAS	90 DAS	At harvest	30 DAS	60 DAS	90 DAS	At harvest	30-60 DAS	60-90 DAS	30-60 DAS	60-90 DAS
T1	12.84	11.40	21.60	49.85	62.71	67.53	4.55	10.94	56.73	64.48	144.91	24.44	0.0526	0.0023
T2	12.86	11.64	22.64	52.40	65.29	71.60	4.8	11.93	58.58	63.04	147.62	14.04	0.0508	0.0004
T3	13.02	11.55	22.95	51.89	64.55	70.77	4.92	11.81	58.19	62.44	146.75	13.38	0.0509	0.0004
T4	12.95	11.27	22.41	50.47	63.19	68.45	4.75	11.46	56.95	61.7	143.95	14.93	0.0512	0.0007
T5	13.04	11.31	22.46	50.14	62.90	67.90	4.77	11.38	57.8	61.29	146.89	10.94	0.0519	0.0000
T6	13.24	11.44	23.33	50.95	72.60	76.69	4.84	13.04	62.2	69.54	155.56	23.13	0.0500	0.0016
T7	13.53	12.26	24.42	55.04	72.31	76.64	5.16	13.3	59.68	70.22	146.78	33.30	0.0479	0.0034
T8	13.42	12.07	24.04	54.61	71.69	77.26	5.15	13.2	59.36	69.7	146.08	32.67	0.0479	0.0033
T9	13.76	12.54	24.92	58.47	80.91	81.67	5.18	13.59	66.65	76.88	167.92	39.22	0.0508	0.0037
T10	13.24	12.03	23.97	54.48	70.63	76.07	5.13	13.02	58.49	68.78	143.88	32.51	0.0479	0.0034
T11	13.13	11.60	23.30	54.06	70.01	75.38	4.95	12.92	58.03	68.24	142.77	32.21	0.0479	0.0034
T12	13.76	12.66	24.86	58.04	80.59	79.40	5.16	13.42	64.09	75.87	160.36	43.54	0.0500	0.0042
SEm±	0.48	0.55	1.03	2.04	2.82	2.18	0.17	0.43	1.88	2.45	6.18	7.65	0.0003	0.0008
CD	NS	NS	NS	6.19	8.47	6.57	NS	1.46	5.72	7.38	NS	NS	NS	NS

Table 2: Effect of biodynamic manure and panchgavya on yield of wheat

Treatments	Yield attributes				Yield (kg ha-1)			Harvest index (%)
	Number of effective tillers plant-1	Number of spikelets ear-1	Number of grains ear-1	Ear length (cm)	Grain	Straw	Biological	
T1	4.89	15.37	30.35	8.02	2811	3669	6484	41
T2	5.37	15.52	31.96	8.27	3092	4020	7116	41
T3	5.33	15.46	31.68	8.19	3063	3979	7046	41.50
T4	5.16	14.97	30.89	8.04	2972	3863	6839	41.48
T5	5.14	14.76	30.73	7.96	2952	3836	6792	41.49
T6	5.90	15.81	34.08	10.07	3340	4406	7750	41.07
T7	5.87	16.93	34.65	8.86	3318	4387	7709	41.07
T8	5.89	16.52	34.43	8.79	3331	4366	7701	41.27
T9	6.08	17.68	37.26	10.23	3408	4425	7837	41.58
T10	5.88	16.57	34.04	8.67	3324	4384	7712	41.15
T11	5.84	16.29	33.81	8.60	3335	4350	7689	41.44
T12	6.07	17.56	36.87	10.03	3363	4415	7782	41.16
SEm±	0.09	0.50	1.16	0.22	104	136	244	1.08
CD	0.46	1.66	3.59	0.85	308	403	715	NS

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