E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(10): 931-935
Received: 19-07-2025
Accepted: 21-08-2025

Goutam Kushwah
M.Sc. Scholar, Department of Agronomy, College of Agriculture, Indore, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India

Rajul Soni
Assistant Professor, Medicaps University, Indore, Madhya Pradesh, India

Urawashi Manekar
Assistant Professor, RNTU, Bhopal, Madhya Pradesh, India

AK Sharma
Faculty, College of Agriculture, Indore, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India

Bhavna Tomar
Faculty, College of Agriculture, Indore, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India

Corresponding Author:
Bhavna Tomar
Faculty, College of Agriculture, Indore, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India

Effect of different manures on growth, attributes of wheat (*Triticum aestivum* L.)

Goutam Kushwah, Rajul Soni, Urawashi Manekar, AK Sharma and Bhavna Tomar

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i10m.4086

Abstract
The field experiment entitled "Effect of Different Manures and Fertilizers on Productivity of Wheat (*Triticum aestivum* L.) & Soil Properties." will be carried out at Agricultural Research Farm, College of Agriculture, Indore during *rabi* season of 2022-23.in randomized block design (RBD) with three replications. Along with 8 treatments T_1 100% RDF (120:60:40 Kg/ha of N,P2O5 and K2O respectively), T_2- RDF with10% equivalent N substituted by FYM from basal dose of N, T_3- RDF with 10% equivalent N substituted by Vermicompost from basal dose of N,T_4-RDF with 10% equivalent N substituted by Poultry manure frombasal dose of N, T_5- RDF with 10% equivalent N substituted by Neem cake from basal dose of N, T_6-RDF with 10% equivalent N substituted by Karanj cake from basal dose of N, T_7-RDF with 10% equivalent N substituted by Castor cake from basaldose of N and T_8-Control(90% of recommended Nitrogen with recommended P and K)plant height was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N), maximum (58.18) number of tillers/meter row length was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (57.25), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (53.51) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (51.38). The significantly lowest number of tillers/meter row length (38.65) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)). The higher dry matter accumulation per plant in treatments T_1, T_2, T_3, and T_4 can be attributed to their fertilization approaches.

Keywords: Wheat, *Triticum aestivum*, manures, fertilizers, FYM, vermicompost

Introduction
Wheat (*Triticum aestivum* L.) is the most important staple food of about 36% of the world population and improvement in its productivity has played a key role in making the country self-sufficient in food grains (Tiwari *et al*., 2017) [3]. Wheat is an annual grass that belongs to the Poaceae family and is scientifically known as *Triticum* spp. The crop is typically planted in the fall and harvested in the summer, although the exact timing may vary depending on the climate and growing conditions. Wheat is one of the chief sources of diet by providing half of the dietary protein and more than half of the calories to the rising population of India. As a consequence, scientists are always focusing to produce higher yields to feed the nation (Khan *et al*., 2015) [1].

Wheat is one the oldest and world's second most important cereal crop after rice. Wheat indeed is the most favourable cereal grain as it contains higher protein than maize and rice and occupies a central place in human nutrition providing 20 per cent of the daily protein and food calories.

The nutritive value of wheat is fairly high as compared to other cereals. It contains protein (11.80%), fat (1.50%), carbohydrates (71.20%), mineral matter (1.50%), calcium (0.50%) and phosphorus (0.32%) (Swaminathan *et al*., 1981) [5]. Wheat protein is known as gluten which provides the structural framework for the spongy, cellular texture of bread and bakery products. Apart from food purposes, wheat grains have also industrial importance for manufacturing paste, alcohol, gluten etc. Residues obtained after milling *i.e.* bran used as cattle feed. Wheat straw is utilized as a fodder for feeding the livestock and also useful in manufacturing mattresses, straw hats, paper and articles of art purposes. Wheat straw is also a good source of bedding material for livestock.

Materials and Methods

Field experiment was conducted at Agricultural Research Farm, College of Agriculture, Indore during *rabi* season of 2022-23. Geographical Situation and Normal Climate and Weather Condition of Indore is located in western Madhya Pradesh, India. It has a semi-arid subtropical climate. The city sits at an elevation of 553 meters above sea level. Indore is situated at 22.43° north latitude and 75.66° east longitude. The average yearly rainfall is 950 mm. Most of the rain falls during the monsoon season from mid-June to mid- September. Weather conditions during the crop growth season are detailed information of weekly total rainfall, temperature, relative humidity and wind velocity during crop season (12th December, 2022 to 02nd April, 2023) were recorded properly at the meteorological observatory under Meteorological department, College of Agriculture, Indore the weekly mean maximum and minimum temperature during crop growth varied from 6.29 to 22.75 °C and 21.14 to 36.89 °C, respectively. The maximum temperature was recorded 36.89 °C (Week No. 13) whereas minimum temperature was recorded 6.29°C (Week No. 03), respectively.

Results and Discussion

1. Plant height (cm) at 30, 60, 90 DAS and at harvest stage

The data pertaining 30 days after transplanting maximum (32.36cm) plant height was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (31.36cm), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (30.67cm) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (30.52cm). The significantly plant height (29.13cm) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The data pertaining 60 days after transplanting maximum (52.40cm) plant height was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (50.41cm), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (49.86cm) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (49.55cm). The significantly plant height (47.19cm) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The data pertaining 90 days after transplanting maximum (85.51cm) plant height was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (84.33cm), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (83.54cm) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (83.35cm). The significantly lowest plant height (73.20cm) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

At harvest the significantly maximum (87.80cm) plant height was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (86.59cm), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (84.45cm) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (83.93cm). The significantly lowest plant height (74.63cm) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The higher plant heights observed in treatments T_1, T_2, T_3, and T_4 can be attributed to their respective fertilization strategies. Treatment T_1, which received the complete recommended dose of fertilizers (RDF), provided the necessary nutrients— nitrogen, phosphorous, and potassium—in balanced proportions, supporting optimal plant growth throughout the growth stages. Similarly, treatments T_2, T_3, and T_4 incorporated organic sources (FYM, Vermicompost, and Poultry Manure) as partial substitutes for nitrogen. These organic amendments not only contributed nutrients but also improved soil structure and microbial activity, fostering better nutrient uptake and overall plant development. This balanced nutrient supply from both inorganic and organic sources likely enhanced cell division, elongation, and overall plant height. In contrast, treatment T_8, with reduced nitrogen content, exhibited lower plant heights due to insufficient nutrient availability, indicating the importance of proper fertilization in achieving optimal wheat growth. These outcomes are consistent with findings of Ali *et al*. (2019).

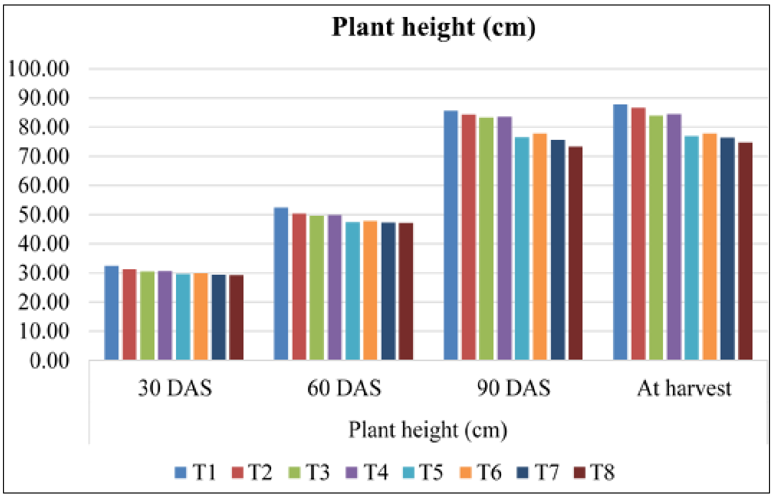

Fig 1: Effect of different manures and fertilizers on plant height (cm) at 30, 60, 90 DAS and at harvest stage

Table 1: Effect of different manures and fertilizers on plant height (cm) at 30, 60, 90 DAS and at harvest stage.

Tr. No.	Treatment details	Plant height (cm)			
		30 DAS	60 DAS	90 DAS	At harvest
T_1	100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)	32.36	52.40	85.51	87.80
T_2	RDF with 10% equivalent N substituted by FYM from basal dose of N	31.26	50.41	84.33	86.59
T_3	RDF with 10% equivalent N substituted by Vermicompost from basal dose of N	30.52	49.55	83.35	83.93
T_4	RDF with 10% equivalent N substituted by Poultry manure from basal dose of N	30.67	49.86	83.54	84.45
T_5	RDF with 10% equivalent N substituted by Neem cake from basal dose of N	29.47	47.49	76.41	76.82
T_6	RDF with 10% equivalent N substituted by Karanj cake from basal dose of N	29.69	47.88	77.64	77.64
T_7	RDF with 10% equivalent N substituted by Castor cake from basal dose of N	29.31	47.31	75.50	76.30
T_8	Control (90% of recommended Nitrogen with recommended P and K)	29.13	47.19	73.20	74.63
	Sem ±	0.64	0.97	1.21	2.23
	CD (0.05) =	1.94	2.93	3.68	6.77

2. Number of tillers/meter row length at 30, 60, 90 DAS and at harvest stage

The data pertaining 30 days after transplanting maximum (58.18) number of tillers/meter row length was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (57.25), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (53.51) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (51.38). The significantly lowest number of tillers/meter row length (38.65) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The data pertaining 60 days after transplanting maximum (81.90) number of tillers/meter row length was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (76.06), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (75.49) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (74.78). The significantly lowest number of tillers/meter row length (48.81) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The data pertaining 90 days after transplanting maximum (115.26) number of tillers/meter row length was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (108.98), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (103.76) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (101.59). The significantly lowest number of tillers/meter row length (83.15) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

At harvest the significantly maximum (108.11) number of tillers/meter row length was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (101.93), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (96.91) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (94.59). The significantly lowest number of tillers/meter row length (76.71) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The higher number of tillers per meter row length in treatments T_1, T_2, T_3, and T_4 can be attributed to their respective fertilization strategies. Treatment T_1, which received the full recommended dose of fertilizers (RDF), provided a balanced supply of essential nutrients (nitrogen, phosphorous, and potassium), promoting robust tiller formation. Similarly, treatments T_2, T_3, and T_4 utilized organic sources (FYM, Vermicompost, and Poultry Manure) as partial substitutes for nitrogen. These organic amendments not only supplied nutrients but also enhanced soil fertility and microbial activity, resulting in improved tiller initiation and growth. The balanced nutrient availability from both inorganic and organic sources likely stimulated the growth of lateral shoots, leading to a higher number of tillers. In contrast, treatment T_8, with reduced nitrogen content, exhibited fewer tillers due to inadequate nutrient availability, highlighting the significance of proper fertilization for optimal tiller development in wheat. Also, similar results were reported by Rehman *et al.* (2010).

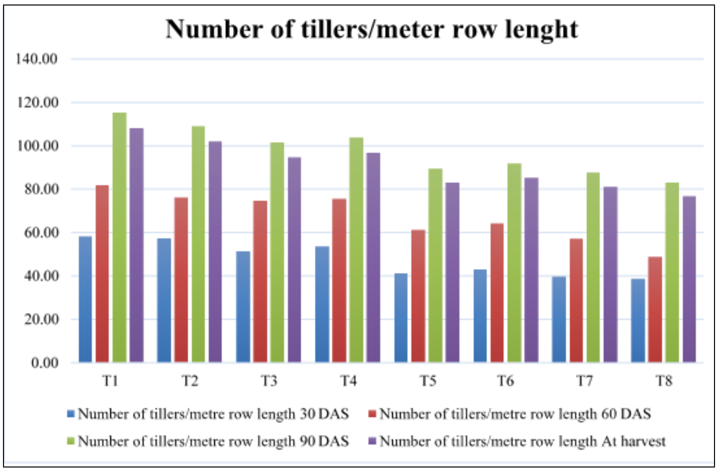

Fig 2: Effect of different manures and fertilizers on number of tillers/meter row length at 30, 60, 90 DAS and at harvest stage

Table 2: Effect of different manures and fertilizers on number of tillers/meter row length at 30, 60, 90 DAS and at harvest stage

Tr. No.	Treatment details	Number of tillers/meter row length			
		30 DAS	60 DAS	90 DAS	At harvest
T_1	100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)	58.18	81.90	115.26	108.11
T_2	RDF with 10% equivalent N substituted by FYM from basal dose of N	57.25	76.06	108.98	101.93
T_3	RDF with 10% equivalent N substituted by Vermicompost from basal dose of N	51.38	74.78	101.59	94.59
T_4	RDF with 10% equivalent N substituted by Poultry manure from basal dose of N	53.51	75.49	103.76	96.91
T_5	RDF with 10% equivalent N substituted by Neem cake from basal dose of N	41.22	61.15	89.46	82.95
T_6	RDF with 10% equivalent N substituted by Karanj cake from basal dose of N	42.91	64.18	91.77	85.21
T_7	RDF with 10% equivalent N substituted by Castor cake from basal dose of N	39.69	57.10	87.58	81.05
T_8	Control (90% of recommended Nitrogen with recommended P and K)	38.65	48.81	83.15	76.71
	Sem ±	2.93	3.17	5.49	5.35
	CD (0.05) =	8.90	9.63	16.64	16.23

3. Dry matter accumulation/plant (g) at 30, 60, 90 DAS and at harvest stage

The data pertaining 30 days after transplanting maximum (6.32g) dry matter accumulation/plant was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (6.12g), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (5.83g) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (5.47g). The significantly lowest dry matter accumulation/plant (4.26) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The data pertaining 60 days after transplanting maximum (9.92g) dry matter accumulation/plant was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (9.13g), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (8.78g) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (8.56g). The significantly lowest dry matter accumulation/plant (7.49g) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The data pertaining 90 days after transplanting maximum (17.98g) dry matter accumulation/plant was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (16.32g), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (15.54g) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (14.77g). The significantly lowest dry matter accumulation/plant (12.29g) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

At harvest the significantly maximum (20.65g) dry matter accumulation/plant was found in treatment T_1 (100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)) which was at par with the treatment T_2 (RDF with 10% equivalent N substituted by FYM from basal dose of N) (19.97g), T_4 (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (19.87g) and T_3 (RDF with 10% equivalent N substituted by Vermicompost from basal dose of N) (19.85g). The significantly lowest dry matter accumulation/plant (18.10g) was observed in treatment T_8 (Control (90% of recommended Nitrogen with recommended P and K)).

The higher dry matter accumulation per plant in treatments T_1, T_2, T_3, and T_4 can be attributed to their fertilization approaches. Treatment T_1, receiving the full recommended dose of fertilizers (RDF), provided optimal nutrients (nitrogen, phosphorous, and potassium) that enhanced photosynthesis and overall growth. Similarly, T_2, T_3, and T_4 used organic sources (FYM, Vermicompost, and Poultry Manure) as partial nitrogen substitutes, enriching soil health and nutrient availability. This balanced nutrient supply likely bolstered metabolic activities, leading to increased dry matter accumulation. Conversely, T_8, with reduced nitrogen content, exhibited lower accumulation due to nutrient limitations. This underscores the importance of proper fertilization for robust wheat growth. Similar result was also reported by Yadav and Meena.

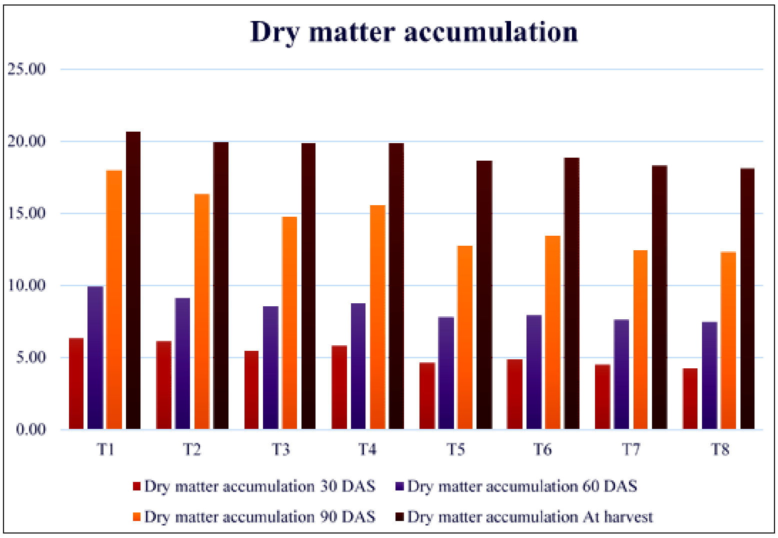

Fig 3: Dry matter accumulation/plant (g) at 30, 60, 90 DAS and at harvest stage

Table 3: Dry matter accumulation/plant (g) at 30, 60, 90 DAS and at harvest stage

Tr. No.	Treatment details	Dry matter accumulation			
		30 DAS	60 DAS	90 DAS	At harvest
T_1	100% RDF (120:60:40 Kg/ha of N, P2O5 and K2O respectively)	6.32	9.92	17.98	20.65
T_2	RDF with 10% equivalent N substituted by FYM from basal dose of N	6.12	9.13	16.32	19.97
T_3	RDF with 10% equivalent N substituted by Vermicompost from basal dose of N	5.47	8.56	14.77	19.85
T_4	RDF with 10% equivalent N substituted by Poultry manure from basal dose of N	5.83	8.78	15.54	19.87
T_5	RDF with 10% equivalent N substituted by Neem cake from basal dose of N	4.62	7.79	12.78	18.65
T_6	RDF with 10% equivalent N substituted by Karanj cake from basal dose of N	4.84	7.91	13.44	18.84
T_7	RDF with 10% equivalent N substituted by Castor cake from basal dose of N	4.50	7.64	12.47	18.32
T_8	Control (90% of recommended Nitrogen with recommended P and K)	4.26	7.49	12.29	18.10
	Sem ±	0.44	0.49	1.20	0.31
	CD (0.05) =	1.34	1.48	3.63	0.93

Conclusion

The research study was conducted at the Instructional Farm of College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Indore, during the *rabi* season year 2022-23. The higher plant heights observed in treatments T_1, T_2, T_3, and T_4 can be attributed to their respective fertilization strategies. Treatment T_1, which received the complete recommended dose of fertilizers (RDF), provided the necessary nutrients— nitrogen, phosphorous, and potassium—in balanced proportions, supporting optimal plant growth throughout the growth stages. Similarly, treatments T_2, T_3, and T_4 incorporated organic sources (FYM, Vermicompost, and Poultry Manure) as partial substitutes for nitrogen. The higher number of tillers per meter row length in treatments T_1, T_2, T_3, and T_4 can be attributed to their respective fertilization strategies. Treatment T_1, which received the full recommended dose of fertilizers (RDF), provided a balanced supply of essential nutrients (nitrogen, phosphorous, and potassium), promoting robust tiller formation. Similarly, treatments T_2, T_3, and T_4 utilized organic sources (FYM, Vermicompost, and Poultry Manure) as partial substitutes for nitrogen. The higher dry matter accumulation per plant in treatments T_1, T_2, T_3, and T_4 can be attributed to their fertilization approaches. Treatment T_1, receiving the full recommended dose of fertilizers (RDF), provided optimal nutrients (nitrogen, phosphorous, and potassium) that enhanced photosynthesis and overall growth. Similarly, T_2, T_3, and T_4 used organic sources (FYM, Vermicompost, and Poultry Manure)

References

1. Khan S, Memon AN, Deverajani BR, Baloch S. Physicochemical characteristics of wheat grain and their relation with proteins in different varieties cultivated in Sindh. Sindh Univ Res J. 2015;47(4):839-42.
2. Kumar D, Prakash V, Singh P, Ahamad A, Kumar C, Kumar A, *et al*. Effect of integrated nutrient management modules on yield, quality and economics of wheat. J Pharmacogn Phytochem. 2013;6(6):709-11.
3. Tiwari A, Rai OP, Singh G, Sharma JD, Harikesh, Singh V. Studies on effect of nitrogen and weed management on yield and economics of late sown wheat. J Pharmacogn Phytochem. 2017;6(6):379-83.
4. IWPS (International Wheat Production Statistics). 2022. Available from: https://en.wikipedia.org/wiki/
5. Swaminathan M, Kanthajosheph M, Rao N, Chandiramani SV, Subramanyam L, Indra K. Balanced diet and nutritive value of common recipes. 2nd ed. Mangalore: Sharda Press; 1981.