International Journal of Advanced Biochemistry Research

**ISSN Print:** 2617-4693
**ISSN Online:** 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; SP-9(10): 1881-1883
www.biochemjournal.com
Received: 08-07-2025
Accepted: 11-08-2025

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

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

**Urawashi Manekar**
Assistant Professor, Rani Durgavati University (RNTU), Bhopal, Madhya Pradesh, India

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

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

# Evaluate the effect of various treatments on soil properties of wheat (*Triticum aestivum* L.)

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

**DOI:** https://www.doi.org/10.33545/26174693.2025.v9.i10Sw.6111

**Abstract**
The field experiment entitled "Effect of Different Manures and Fertilizers on Productivity of Wheat (*Triticum aestivum* L.) & Soil Properties" was carried out at the Agricultural Research Farm, College of Agriculture, Indore, during the Rabi season of 2022-23 in a Randomized Block Design (RBD) with three replications. The experiment included 8 treatments $T_1$: 100% RDF (120:60:40 kg/ha of N, $P_2O_5$, and $K_2O$, respectively) $T_2$: RDF with 10% 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 from basal 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 basal dose of N $T_8$ (Control): 90% of recommended Nitrogen with recommended P and K The significantly highest available NPK (kg/ha) after harvesting was recorded with $T_1$ (204.17, 13.06, and 370.05 kg/ha), which was at par with $T_2$ (203.54, 12.21, and 368.33 kg/ha) and $T_4$ (202.13, 11.49, and 365.52 kg/ha). The significantly lowest available NPK (kg/ha) was recorded in $T_8$ (Control) (161.73, 8.54, and 350.11 kg/ha).

**Keywords:** Wheat, manures, fertilizers, soil, nutrients, rabi

## 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. 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) [4].

Nutrient management involves the judicious blend of organic, inorganic fertilizers along with biofertiliser which maintains soil fertility, productivity, and ultimately causes a significant reduction in chemical fertilizers which is cost effective. The aim is ecologically safety exploitation of local resources which can produce desired yield and maintained soil health on long term basis. Increase in the deterioration of soil health and productivity due to continuous use of large quantities of chemical fertilizers, resulting environmental pollution and concern for sustainable agriculture with emphasis on eco-friendly inputs have resulted in the renewed interest on integrated plant nutrient supply systems. The basic concept underlying the integrated plant nutrient supply system is the maintenance of soil fertility, sustaining agricultural productivity and improving farmer's profitability through judicious and efficient use of chemical fertilizers and organic manures (Singh *et al.*, 2003) [6].

Farmyard manure is bulky organic manure resulting from decomposed mixture of dung and urine of farm animals. Application of FYM is of greater significance for sustainability as it has great potentiality to improve the physical properties of soil besides supplying nutrients. Each of these physical properties has large practical implication in maintaining soil as a medium of production and great role in halting environmental degradation.

Maintaining and improving them in long run is essential part of sustaining the ecosystem. FYM is a good source of nutrients and contributed towards build-up of organic matter in soil (Das *et al.*, 2008) [2] and it is not only supply macro and micronutrients but also improve the soil physical, chemical and biological properties of the soil. The importance of micronutrients applications in increasing crop productivity has been recognized in India. Zinc deficiency is a common phenomenon in cereals (Singh, 2017) [7].

## 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 (12$^{th}$ December, 2022 to 02$^{nd}$ 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

### Soil analysis after harvest

### 1. Available NPK (kg/ha)

The significantly highest available NPK (kg/ha) after harvesting of crop (204.17, 13.06 and 370.05 kg/ha) was recorded with treatment $T_1$ (100 % RDF (120:60:40 Kg/ha of N, $P_2O_5$ and $K_2O$ respectively)) which was at par with $T_2$ (RDF with 10% equivalent N substituted by FYM from basal dose of N) (203.54, 12.21 and 368.33 NPK kg/ha) and $T_4$ (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (202.13, 11.49 and 365.52 NPK kg/ha). The significantly lowest available NPK (kg/ha) after harvesting of crop was recorded in treatment $T_8$ (Control (90% of recommended Nitrogen with recommended P and K)) (161.73, 8.54 and 350.11 NPK kg/ha) respectively.

The result revealed that treatment $T_1$, which received the full recommended dose of fertilizers (120:60:40 Kg/ha of N, $P_2O_5$, and $K_2O$), exhibited significantly higher available NPK levels (204.17 kg/ha nitrogen, 13.06 kg/ha phosphorus, and 370.05 kg/ha potassium) after harvest. This finding suggests that providing the complete recommended nutrient supply results in substantial nutrient accumulation in the soil, indicating a potential for sustained soil fertility.

Similar outcomes were observed in treatments $T_2$ and $T_4$, where 10% of the equivalent nitrogen was substituted with organic sources (FYM and poultry manure respectively). These treatments yielded comparable available NPK levels (203.54, 12.21, and 368.33 kg/ha respectively), underlining the effectiveness of organic amendments in maintaining or even enhancing post-harvest nutrient availability.

In contrast, treatment $T_8$, which received 90% of the recommended nitrogen along with recommended phosphorus and potassium, displayed significantly lower available NPK levels (161.73, 8.54, and 350.11 kg/ha respectively). This implies that reducing nitrogen supply adversely affects the residual nutrient content in the soil after crop removal. Overall, the results highlight the importance of balanced fertilization practices in influencing post-harvest nutrient availability. Adequate nutrient supply, whether through synthetic fertilizers or organic sources, plays a vital role in sustaining soil fertility and ensuring the long-term productivity of wheat cultivation. The results obtained in the present study are supported by the works of Nishant *et al.* (2021) [8].

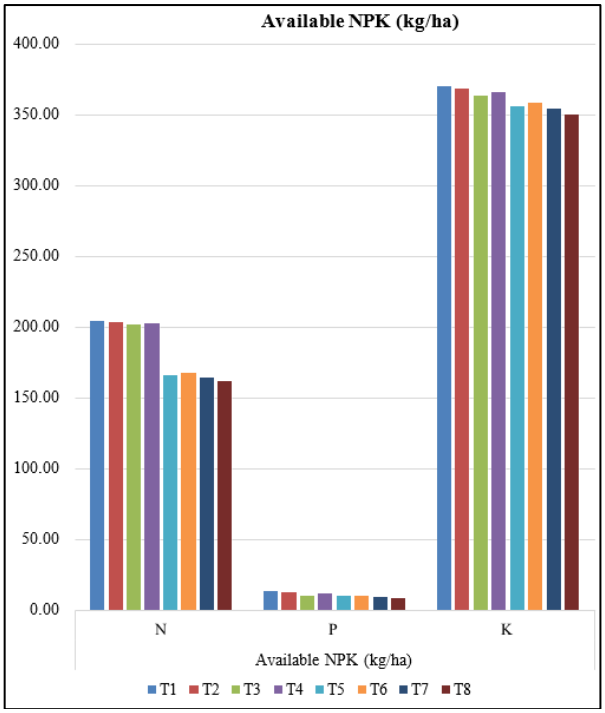


**Fig 1:** Effect of different manures and fertilizers on available NPK (kg/ha)

**Table 1:** Effect of different manures and fertilizers on available NPK (kg/ha)

| Tr. No. | Treatment details | Available NPK (kg/ha) | | |
|---|---|---|---|---|
| | | N | P | K |
| $T_1$ | 100 % RDF (120:60:40 Kg/ha of N, $P_2O_5$ and $K_2O$ respectively | 204.17 | 13.06 | 370.05 |
| $T_2$ | RDF with 10% equivalent N substituted by FYM from basal dose of N | 203.54 | 12.21 | 368.33 |
| $T_3$ | RDF with 10% equivalent N substituted by Vermicompost from basal dose of N | 201.21 | 10.21 | 363.12 |
| $T_4$ | RDF with 10% equivalent N substituted by Poultry manure from basal dose of N | 202.13 | 11.49 | 365.52 |
| $T_5$ | RDF with 10% equivalent N substituted by Neem cake from basal dose of N | 185.47 | 9.47 | 355.36 |
| $T_6$ | RDF with 10% equivalent N substituted by Karanj cake from basal dose of N | 186.33 | 9.76 | 357.87 |
| $T_7$ | RDF with 10% equivalent N substituted by Castor cake from basal dose of N | 183.95 | 8.94 | 354.23 |
| $T_8$ | Control (90% of recommended Nitrogen with recommended P and K) | 161.73 | 8.54 | 350.11 |
| | Sem ± | 1.21 | 0.96 | 2.53 |
| | CD (0.05) = | 3.67 | 2.92 | 7.67 |

## Conclusion

The significantly highest available NPK (kg/ha) after harvesting of crop (204.17, 13.06 and 370.05 kg/ha) was recorded with treatment $T_1$ (100 % RDF (120:60:40 Kg/ha of N, $P_2O_5$ and $K_2O$ respectively)) which was at par with $T_2$ (RDF with 10% equivalent N substituted by FYM from basal dose of N) (203.54, 12.21 and 368.33 NPK kg/ha) and $T_4$ (RDF with 10% equivalent N substituted by Poultry manure from basal dose of N) (202.13, 11.49 and 365.52 NPK kg/ha). The significantly lowest available NPK (kg/ha) after harvesting of crop was recorded in treatment $T_8$ (Control (90% of recommended Nitrogen with recommended P and K)) (161.73, 8.54 and 350.11 NPK kg/ha) respectively.

The result revealed that treatment $T_1$, which received the full recommended dose of fertilizers (120:60:40 Kg/ha of N, $P_2O_5$, and $K_2O$), exhibited significantly higher available NPK levels (204.17 kg/ha nitrogen, 13.06 kg/ha phosphorus, and 370.05 kg/ha potassium) after harvest. This finding suggests that providing the complete recommended nutrient supply results in substantial nutrient accumulation in the soil, indicating a potential for sustained soil fertility.

## References


1. Anonymous. Agricultural statistics at a glance. New Delhi: Ministry of Agriculture and Farmers Welfare, Government of India; 2020.
2. Das B, Chakraborty D, Singh VK, Aggarwal P, Singh R, Dwivedi BS, *et al.* Nutrient management practice on soil aggregate properties, its stability and aggregate-associated carbon content in an intensive rice-wheat system. Soil Tillage Res. 2008;136:9-18.
3. IWPS (International Wheat Production Statistics). c2022. Available from: https://en.wikipedia.org/wiki/
4. 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 University Research Journal. 2015;47(4):839-842.
5. 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. Journal of Pharmacognosy and Phytochemistry. 2001;6(6):709-711.
6. Singh B, Singh J, Singh G, Kaur G. Effects of long-term application of inorganic and organic fertilizers on soil organic carbon and physical properties in maize-wheat rotation. Agronomy. 2003;5(2):220-238.
7. Singh G, Kumar S, Sindhu GS, Kaur R. Effect of nutrient management on yield of wheat (*Triticum aestivum* L.) under irrigated conditions. International Journal of Chemical Studies. 2017;6:904-907.
8. Nishanth Rao R, Jena S, Mukherjee M, Maiti B, Chanda K. Green synthesis of biologically active heterocycles of medicinal importance: A review. Environmental Chemistry Letters. 2021 Aug;19(4):3315-3358.