
**ISSN Print:** 2664-844X
**ISSN Online:** 2664-8458
NAAS Rating (2025): 4.97
IJAFS 2025; 7(7): 496-499
www.agriculturaljournals.com
Received: 05-05-2025
Accepted: 09-06-2025

**Meena Choudhary**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Bhagwan Suman**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Rajendra Bairwa**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Om Prakash Regar**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Promod Mehta**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Subhash Prajapat**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Amrit Lal Damor**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

**Corresponding Author:**
**Meena Choudhary**
Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh Rajasthan, India

# Assessment of weed management and nutrient management performance on wheat productivity under sub humid-climatic condition

**Meena Choudhary, Bhagwan Suman, Rajendra Bairwa, Om Prakash Regar, Promod Mehta, Subhash Prajapat and Amrit Lal Damor**

**DOI:** https://www.doi.org/10.33545/2664844X.2025.v7.i7g.549

**Abstract**
A field experiment was conducted at research farm, Department of Agronomy, Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh (Rajasthan) during Rabi season of 2024-25 to to evaluate the combined effects of Integrated Weed Management (IWM) and Integrated Nutrient Management (INM) on growth, yield attributes, and yield of wheat. The results revealed that the combined application of 100% Recommended Dose of Fertilizers (RDF) with Clodinafop + Metsulfuron ($T_5$) significantly improved plant population (51.68 plants/m row), plant height (93.45 cm at harvest), spike length (11.25 cm), grains per spike (36.45), grain yield (42.32 q/ha), and straw yield (56.60 q/ha), which were at par with $T_4$ (RDF + Sulfosulfuron + Metsulfuron) and $T_6$ (RDF + Sulfosulfuron + Carfentrazone). The lowest values for all growth and yield parameters were observed under the control. However, the treatments had a non-significant effect on the harvest index. These findings highlight that integrating nutrient and weed management practices can effectively enhance wheat productivity and resource use efficiency under field conditions.

**Keywords:** Integrated weed management, integrated nutrient management, plant population, plant height, yield

## 1. Introduction
Wheat (*Triticum aestivum* L.) is the second most important cereal crop in India after rice, contributing about 36.2% of the nation's total food grain supply and playing a vital role in national food security (Negi, 2015) [11]. As a major rabi crop grown mainly in the northern plains and north-western Himalayas, wheat provides essential carbohydrates, protein, and gluten, making it a staple for bread and other products (Swaminathan *et al.,* 1981) [15]. Efficient nutrient management is critical for sustaining high yields, but excessive reliance on inorganic fertilizers deteriorates soil health over time (Yadav *et al.,* 2000) [17]. Integrated nutrient management combining farmyard manure (FYM) and chemical fertilizers improves soil properties and crop productivity (Deen *et al.,* 2021) [4]. In addition to nutrient management, weed infestation is a major constraint that can reduce wheat yields by 20–32% due to severe competition for nutrients, moisture, light, and space (Jat *et al.,* 2003; Chhokar *et al.,* 2012) [6, 3]. *Phalaris minor, Avena ludoviciana,* and various broadleaf weeds are significant threats in wheat fields, with herbicides like Clodinafop-propargyl, Sulfosulfuron, and Metsulfuron-methyl showing promise for effective control. Therefore, integrated weed and nutrient management strategies are essential for sustainable wheat production. This study aims to evaluate nutrient sources and herbicide combinations to optimize wheat yield and resource use in challenging agro-environments, with an emphasis on sustainable practices and improved technology adoption.

## 2. Materials and Methods
A field experiment was conducted during Rabi season of 2024-25 at research farm, Faculty of Agriculture and Veterinary Sciences, Mewar University Gangrar, Chittorgarh (Rajasthan). The experiment was laid out in randomized block design with three replications consisting of nine treatments *viz.* $T_1$-Control, $T_2$-100% RDF, $T_3$-75% RDF + 10 t/ha FYM, $T_4$100% RDF +

Sulfosulfuron + Metsulfuron, $T_5$-100% RDF + Clodinofop + Metsulfuron, $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone, $T_7$-75% RDF + 5 t/ha FYM + Sulfosulfuron + Metsulfuron, $T_8$-75% RDF + Clodinofop + Metsulfuron and $T_9$-Seed treatment with Nano-P75% RDF + Sulfosulfuron+ Carfentrazone. The required quantities of fertilizers as per treatments were applied. Experimental data recorded in various observations were statistically analyzed in accordance with the "analysis of variance" technique as described by Panse and Sukhatme (1985).

## 3. Results and Discussion

### 3.1 Growth attributes

The data was showed the the IWM and INM management give significant impact on plant population at harvest. The maximum plant population was observed with treatments $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) (51.68 per m row length), it was found at par with $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) and $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) (50.52 and 49.32 per m row length). The minimum plant population was observed with control treatments (37.52 per m row length). Similar result also reported by Singh *et al.* (2025) [13], Jat *et al.* (2024) [5] Tiwari *et al*. (2023) [16], Sunag *et al.* (2021) [14] and Baradhan and Kumar (2018) [1].

The IWM and INM management give significant impact on plant height at 30, 60, 90 DlAS and at harvest. The maximum plant height was observed with treatments $T_5$-100% RDF + Codinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) (26.28, 53.63, 92.20 and 93.45 cm), it was found at par with $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) (25.85, 53.88, 90.12 and 92.25 cm) and $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) (24.65, 52.85, 89.84 and 91.65 cm). The minimum plant population was observed with control treatments (17.45, 37.63, 68.52 and 70.25 cm), respectively. Similar result also reported by Jat *et al.* (2024) [5], Baradhan and Kumar (2018) [1], Mohan *et al.* (2018) [9] and Meena *et al.* (2017) [8].

### 3.2 Yield attributes and Yield

The IWM and INM management give significant impact on spike length. The maximum spike length was observed with treatments $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) (11.25 cm), it was found at par with $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) and $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) (10.78 and 10.36 cm). The minimum spike length was observed with control treatments (8.45 cm). The IWM and INM management give significant impact on number of grains per spike. The maximum number of grains per spike was observed with treatments $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) (36.45), it was found at par with $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) and $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) (35.85 and 34.25). The minimum number of grains per spike was observed with control treatments (24.23). Similar result also reported by Singh *et al.* (2025) [13], Sunag *et al.* (2021) [14], Baradhan and Kumar (2018) [1], Seyedlar *et al.* (2014) [12] and Basak *et al.* (2013) [2].

The IWM and INM management give significant impact on grain yield. The maximum grain yield was observed with treatments $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) (42.32 q/ha), it was found at par with $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) and $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) (41.28 and 40.44 q/ha). The minimum grain yield was observed with control treatments (25.85 q/ha). The IWM and INM management give significant impact on straw yield. The maximum straw yield was observed with treatments $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) (56.60 q/ha), it was found at par with $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) and $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) (55.56 and 54.72 q/ha). The minimum straw yield was observed with control treatments (38.13 q/ha). The combine application strategies of IWM and INM give non-significant impact on harvest index. Similar result also reported by Singh *et al.* (2025) [13], Seyedlar *et al.* (2014) [12], Basak *et al.* (2013) [2], Mubarak and Singh (2011) [10] and Laghari *et al.* (2010) [7].

## 4. Conclusion

The present study clearly demonstrated that the combined application of Integrated Weed Management (IWM) and Integrated Nutrient Management (INM) significantly improved wheat growth, yield attributes, and yield over the control. Among the treatments, the use of 100% RDF along with Clodinafop + Metsulfuron, Sulfosulfuron + Metsulfuron, and Sulfosulfuron + Carfentrazone recorded higher plant population, plant height, spike length, number of grains per spike, grain yield, and straw yield, with no significant effect on harvest index. These results confirm that integrating effective weed control measures with balanced nutrient management enhances wheat productivity sustainably.

**Table 1:** Effect of IWM and INM on plant population at 20 DAS and at harvest of wheat

| Treatments | Plant population/m row length | |
|---|---|---|
| | 20 DAS | At harvest |
| $T_1$-Control | 40.80 | 37.52 |
| $T_2$-100% RDF | 49.60 | 46.32 |
| $T_3$-75% RDF + 10 t/ha FYM | 48.91 | 45.63 |
| $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) | 53.80 | 50.52 |
| $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 54.96 | 51.68 |
| $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 52.60 | 49.32 |
| $T_7$-75% RDF + 5 t/ha FYM + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$ + 2 g a.i. $ha^{-1}$) | 51.86 | 48.58 |
| $T_8$-75% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 51.28 | 48.00 |
| $T_9$-75% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 50.53 | 47.25 |
| S. Em. ± | 1.17 | 0.82 |
| CD% | NS | 2.49 |
| CV% | 5.22 | 5.07 |

**Table 2:** Effect of IWM and INM on plant height at 30, 60, 90 DAS and at harvest of wheat

| Treatments | Plant height (cm) | | | |
|---|---|---|---|---|
| | 30 DAS | 60 DAS | 90 DAS | At harvest |
| $T_1$-Control | 17.45 | 37.63 | 68.52 | 70.25 |
| $T_2$-100% RDF | 21.15 | 48.00 | 85.20 | 87.36 |
| $T_3$-75% RDF + 10 t/ha FYM | 20.45 | 46.96 | 83.65 | 85.12 |
| $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) | 25.85 | 53.88 | 90.12 | 92.25 |
| $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 26.28 | 55.63 | 92.20 | 93.45 |
| $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 24.65 | 52.85 | 89.84 | 91.65 |
| $T_7$-75% RDF + 5 t/ha FYM + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$ + 2 g a.i. $ha^{-1}$) | 23.76 | 51.36 | 88.72 | 90.58 |
| $T_8$-75% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 22.78 | 49.50 | 87.55 | 89.14 |
| $T_9$-75% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 22.02 | 48.52 | 86.65 | 88.32 |
| S. Em. ± | 0.60 | 0.98 | 0.84 | 0.65 |
| CD% | 1.79 | 2.93 | 2.50 | 1.96 |
| CV% | 6.12 | 6.75 | 6.82 | 6.45 |

**Table 3:** Effect of IWM and INM on spike length and number of grains per spike of wheat

| Treatments | Spike length (cm) | Number of grains per spike |
|---|---|---|
| $T_1$-Control | 8.45 | 24.23 |
| $T_2$-100% RDF | 9.35 | 31.25 |
| $T_3$-75% RDF + 10 t/ha FYM | 9.15 | 29.45 |
| $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) | 10.78 | 35.85 |
| $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 11.25 | 36.45 |
| $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 10.36 | 34.25 |
| $T_7$-75% RDF + 5 t/ha FYM + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$ + 2 g a.i. $ha^{-1}$) | 10.05 | 33.85 |
| $T_8$-75% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 9.78 | 33.15 |
| $T_9$-75% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 9.58 | 32.02 |
| S. Em. ± | 0.35 | 0.75 |
| CD% | 1.04 | 2.26 |
| CV% | 7.36 | 7.42 |

**Table 4:** Effect of IWM and INM on test weight and grain yield of wheat

| Treatments | Test weight (g) | Grain yield (q/ha) |
|---|---|---|
| $T_1$-Control | 38.85 | 25.85 |
| $T_2$-100% RDF | 39.12 | 36.45 |
| $T_3$-75% RDF + 10 t/ha FYM | 39.00 | 34.62 |
| $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) | 39.85 | 41.28 |
| $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 40.05 | 42.32 |
| $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 39.78 | 40.44 |
| $T_7$-75% RDF + 5 t/ha FYM + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$ + 2 g a.i. $ha^{-1}$) | 39.68 | 39.36 |
| $T_8$-75% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 39.42 | 38.25 |
| $T_9$-75% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 39.20 | 37.45 |
| S. Em. ± | 0.22 | 0.71 |
| CD% | NS | 2.15 |
| CV% | 5.85 | 7.28 |

**Table 5:** Effect of IWM and INM on straw yield and harvest index of wheat

| Treatments | Straw yield (q/ha) | Harvest index (%) |
|---|---|---|
| $T_1$-Control | 38.13 | 39.18 |
| $T_2$-100% RDF | 50.73 | 41.81 |
| $T_3$-75% RDF + 10 t/ha FYM | 48.90 | 41.45 |
| $T_4$-100% RDF + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$+ 2 g a.i. $ha^{-1}$) | 55.56 | 42.63 |
| $T_5$-100% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 56.60 | 42.78 |
| $T_6$-100% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 54.72 | 42.50 |
| $T_7$-75% RDF + 5 t/ha FYM + Sulfosulfuron + Metsulfuron (30 g a.i. $ha^{-1}$ + 2 g a.i. $ha^{-1}$) | 53.64 | 42.32 |
| $T_8$-75% RDF + Clodinofop + Metsulfuron (60 g a.i. $ha^{-1}$ + 4 g a.i. $ha^{-1}$) | 52.53 | 42.13 |
| $T_9$-75% RDF + Sulfosulfuron+ Carfentrazone (25 g a.i. $ha^{-1}$ + 20 g a.i. $ha^{-1}$) | 51.73 | 41.99 |
| S. Em. ± | 0.66 | 0.23 |
| CD% | 1.99 | NS |
| CV% | 7.74 | 7.86 |

## 5. References


1. Baradhan G, Kumar SS. Studies on the effect of integrated nutrient management in the yield of maize (*Zea mays*). Plant Arch. 2018;18(2):1795-1800.
2. Basak BB, Biswas DR, Pal S. Soil biochemical properties and grain quality as affected by organic manures and mineral fertilizers in soil under maize-wheat rotation. Agrochimica. 2013;57(1):4966.

3. Chhokar RS, Sharma RK, Sharma I. Weed management strategies in wheat-A review. J Wheat Res. 2012;4(2):1-21.
4. Deen K, Singh RP, Singh AK, Shekhar C, Kumar A. Effect of fertility levels and weed management practices on yield attribute and yield of wheat crop (*Triticum aestivum* L.). J Pharmacogn Phytochem. 2021;10(1):2284-2286.
5. Jat ML, Chaplot PC, Meena SN, Dhayal BC. Interaction effects of inorganic, organic and liquid bio-inoculants on yield attributes, yield and economics of barley (*Hordeum vulgare* L.). 2024.
6. Jat RS, Nepalia V, Jat RL. Effect of weed control and sowing methods on production potential of wheat (*Triticum aestivum*). Indian J Agron. 2003;48(3):192-195.
7. Laghari GM, Oad FC, Tunio SD, Gandhi AW, Siddiqui MH, Jagirani AW, *et al*. Growth and nutrient uptake of various wheat cultivars under different fertilizer regimes. Sarhad J Agric. 2010;26(4):489-497.
8. Meena R, Meena RN, Singh RK, Singh YV, Meena RK. Effect of integrated nutrient management on growth, yield, soil fertility and economics of barley (*Hordeum vulgare* L.). Environ Ecol. 2017;35(3C):2361-2366.
9. Mohan B, Kumar P, Yadav RA. Effect of integrated nutrient management on yield attributes and yield of wheat (*Triticum aestivum* L.). J Pharmacogn Phytochem. 2018;7(1):1545-1547.
10. Mubarak T, Singh KN. Nutrient management and productivity of wheat (*Triticum aestivum*)-based cropping systems in temperate zone. Indian J Agron. 2011;56(3):176-181.
11. Negi SC. Management of mixed weed flora in barley with tank- mix application of isoproturon with metsulfuron and 2,4-D. Indian J Weed Sci. 2015;47(1):28–30.
12. Seyedlar SM, Habibi D, Sani B, Hasanpor H. Improving wheat yield and quality through an integrated nutrient management system. Int J Biosci. 2014;5(1):273-281.
13. Singh R, Mishra S, Chaturvedi PK, Mishra CK, Singh V, Gautam B, *et al*. Effect of integrated nutrient management on performance, productivity and economic feasibility of barley (*Hordeum vulgare* L.) in Easter Uttar Pradesh. 2025.
14. Sunag MN, Singh RP, Singh R, Singh K. Effect of integrated nutrient management on the performance of barley (*Hordeum vulgare* L.). Pharma Innov J. 2021;10(9):1492-1496.
15. Swaminathan V, Smith JL, Sundaralingam M, Coutsogeorgopoulos C, Kartha G. Crystal and molecular structure of the antiobiotic blasticidin S hydrochloride pentahydrate. Biochim Biophys Acta BBA Nucleic Acids Protein Synth. 1981;655(3):335-341.
16. Tiwari T, Tiwari US, Sharma S, Pandey HP, Sachan R, Kumar D, *et al*. Effect of Biofortification with Zinc and Iron on Growth Parameters, Yield Attributes and Yield of Barley (*Hordeum vulgare* L.). Int J Plant Soil Sci. 2023;35(18):1148-1157.
17. Yadav RL, Dwivedi BS, Prasad K, Tomar OK, Shurpali NJ, Pandey PS. Yield trends and changes in soil organic C and available NPK in a long-term rice-wheat system under integrated use of manures and fertilizers. Field Crops Res. 2000;68:219-246.