Quest Journals
Journal of Research in Agriculture and Animal Science
Volume 12 ~ Issue 5 (May 2025) pp: 17-21
ISSN(Online) : 2321-9459
www.questjournals.org

Research Paper

Effect of integrated nutrient management on growth and yield of wheat Crop

Durgesh Chaudhary[1]and Kshitij Parmar[1*]

[1]*Amity Institute of Organic Agriculture, Amity University Uttar Pradesh, Sector-125, Noida-201313*
**Correspondingauthor:kparmar@amity.edu*

Abstract. *A field research on my research conducted in Mathura As my topic "effect of Integrated Nutrient Management on Growth and Yield of Wheat Crop" is very clear by its name that my research is to measure the results and changes of integrated nutrient on wheat crop, there is a lot of research and citation are present on that topic but the result of every single research has vary from each other, in my research I had prepared 7 treatments with three replications to measure the resulting this context, field research conducted in Mathura, focusing on the effect of integrated nutrient management on wheat growth and yield, holds significant promise. By rigorously evaluating seven different treatment combinations with three replications, your research endeavours to contribute valuable insights into the complex interactions between nutrients, soil health, and crop productivity in wheat cultivation. By meticulous researchation and careful analysis of results, your study has the potential to advance our understanding of integrated nutrient management practices and their implications for sustainable wheat production.*

Keywords: *Economics, FYM, Nutrients, Yield, Wheat*

R*eceived 13 May., 2025;* ***R****evised 25 May., 2025;* ***A****ccepted 27 May., 2025 © The author(s) 2025.*
P*ublished with open access at* ***www.questjournas.org***

I. Introduction

Wheat stands as the crop of rabi season, flourishing in almost every region of the country. It's predominantly cultivated under rainfed conditions, particularly in areas adjacent to the tail end of canals where water scarcity prevails. However, the average wheat yield in such regions remains notably low, primarily attributed to water shortages (Ashraf, 1998).Waterstress profoundly impacts wheat plants, not only altering their morphology but also severely affecting their metabolic processes. The degree of modification induced by water stress varies depending on factors such as cultivar, growth stage, duration, and intensity of the stress (Mark and Antony, 2005; Araus*et al*., 2002).

Water stress during the critical anthesis stage leads to reduced pollination, resulting in fewer grains formed per spike and ultimately diminishing grain yield (Ashraf, 1998). Conversely, adequate water supply during or after anthesis enables the plant to enhance photosynthesis rates and facilitates the translocation of carbohydrates to grains, thereby promoting grain size and yield improvement (Zhang and Oweis, 1998).

Strategic integration of farmyard manure (FYM) with chemical fertilisers has been shown to enhance soil physical, chemical, and biological properties, consequently improving crop productivity (Sharma *et al*., 2007). Integrated nutrient management (INM) offers an ecologically sound and economically viable approach to wheat production by leveraging available organic and inorganic nutrient sources.Given these considerations, a study was to investigate the impact of integrated nutrient management on wheat growth , yield attributes, & overall yield.

INM aims to maximise crop productivity and resource-use efficiency by making use of various nutrient sources. Excessive use of nitrogen (N) fertilisers has resulted in environmental pollution in certain regions, emphasising the importance of relying on soil-derived nutrients (Peng *et al*., 2002).Soil serves as a vital foundation for crop growth, providing essential elements such as water, anchorage, and nutrients. While soils contain inherent inorganic and organic nutrient reservoirs, additional fertiliser application is often necessary to enhance plant performance (Smaling, 1993). Inorganic fertilisers, including nitrogen, phosphorus, and potassium, are commonly utilised to boost soil fertility and stimulate plant growth, thereby improving crop yields.

II. Material And Method

The experiment work was conducted during the *Rabi* seasonof 2023-24 at the farm in Mathura(UP).The research consisted of seven treatments comprising of different nutrient management practices.

T1-25%RDN+75%N by FYM,T2-50%RDN+50%N by FYM,T3-75%RDN+25%N by FYM,T4-100%RDN+25%N by FYM,T5-100%RDN,T6-125%RDN,T7-CONTROL

The research was done by using randomized block design with 3 replications. The soil of the research al site was clay loam and nearly neutral in reaction. The soil was rated as less in organic carbon & available nitrogen, medium in available phosphorus & available potassium. The layout of the research was done manually and the plots were drawn and then flattened with the help of labour. Variety of wheat "PBW-343" sowed using seed rate of 100 kg ha^{-1}in first week on well prepared seed bed in November, 2020. The different fertilizer rate of nitrogen ha^{-1} was used as nutrient (basal and top dressing). The FYM and Bio Fertilizer was dissolved in soil at the time of sowing of crop for the treatment with nutrient composition of 0.5% nitrogen, 0.2% phosphorus & 0.5% potassium (FYM) and 1.5% nitrogen, 1% phosphorus & 0.60%potassium. The recommended dose of NPK in wheat crop used was 120 kg N, 60 kg P_2O_5 and40 kg K_2O ha^{-1} in irrigated condition, respectively. Half dose ofnitrogen and whole P_2O_5andK_2Owereincorporated in soil, as per the treatments, as basal dose and remaining halfdoseofnitrogenwastop dressed attilleringstageof the wheat crop. All the plots were equally irrigated five times duringthecroppingdurationsOthahandweedingwasdone easily to keep the wheat crop free from weeds plants.

III. Results & discussion of Yield attributes of wheat crop

Different yield attributes of wheat crop presented in Table3 revealed that different yield attributes by number effective till $ersm^2$,no. of grains per spike & 1000 grain weight were significantly influenced by the nutrient management treatments. From different nutrient management treatments, apply of RDN (100%)+25%N by FYM recorded significantly a greater no. of effective tillers per meter square, number of grain per spike and1000grain weight as compared both other treatments. Spike length did not very significantly with the application of various nutrient management treatments. The beneficial effect of nitrogen on crop growth influenced the yield attributes characters positively. The number of effective tillers might be increased in the particular combination as it provides the optimum amount of nutrients required for the crop. The application of fertilizers in over dose or less than the recommended dose might not result in optimum growth and yield of the crop. (Katyal, 2000) also reported that application of 100% NPK significantly affect the number of effective tillers in wheat.

The collections presented in Table one illustrate that different changes of wheat yield of wheat were significantly affected from nutrient management treatments. Notably, the application of recommended dose of fertilizer (RDF) led to significantly higher numbers of effective measurement in sq/m , grains per spike, and 1000-grain weight compared to other treatments. However, spike length remained unaffected by the different nutrient management approaches. This highlights the positive impact of nitrogen on crop growth and yield attributes. It's crucial to ensure the application of theright amount of nutrients, as both over and underdosing can compromise crop growth and yield. Similar findings were reported by (Katyal, 2000), where the apply of 100% RDN +25%N by FYM significantly influenced the no. of effective tillers per square meter in wheat.

Plant height

The application of a treatment consisting of 100% Recommended Dietary Nutrient (RDN) along with 25% nitrogen by Farmyard Manure (FYM) (T4) resulted in notably taller wheat plants compared to those treated solely with 100% RDN across all observation stages and at harvest during both growing seasons. Combining data from two years revealed that T4 yielded wheat plants that were 88% taller than those in the control group at harvest.

The significant increase in wheat plant height observed in T4 could be attributed to several factors. Firstly, the rapid mineralization of chemical fertilizer likely facilitated early nitrogen supply during the crop's initial growth stages. Moreover, FYM contains the available nutrients, growth n promoting substances, & beneficial microorganisms that contribute to nitrogen fixation, glucose decomposition, and other activities, thereby enhancing nutrient availability during later stages of wheat crop development.

This study concludes that FYM acts as a source by various essential plant nutrients & hormones, albeit in low quantities. Additionally, the researchers noted that when applied alongside inorganic fertilizer, FYM enhances growth attributes and yield in wheat, thereby supporting the findings observed in this study.

DRY MATTER ACCUMULATION

T4 consistently exhibited that the higher dry matter (g/meter row length) at wheat harvest, on par with T1 and T6 across all observation stages during crop growth and at harvest. Applied of 100% RDN + 25% N by FYM resulted in a remarkable 332% increase in dry matter production at wheat harvest compared to the control treatment over the years.

The increase in wheat dry matter can be credited to the length of plant and leaf area indices, who facilitated by sufficient & adequate nutrient supply. These improved growth characteristics directly led to the greater production of dry matter. Previous research has also noted similar findings, underscoring the importance of nutrient availability in boosting wheat crop growth and dry matter production.

IV. CONCLUSION

For maintain soil health and achieve significantly more wheat yields compared to the control, it is recommended that wheat growers use a combination of 100% recommended dose of nitrogen (RDN) along with an additional 25% nitrogen supplied by farmyard manure (FYM).

This recommendation dose is based on several factors observed in the study. Firstly, the applied of 100% RDN supplemented 25% nitrogen by farm yard manure resulted in more plant height, leaf area index, and dry matter accumulation compared to other treatments, including the control. These growth parameters are essential indicators of crop vigor and productivity.

Moreover, the integration of chemical fertilizer with organic manures like FYM enhances nutrient availability to the crops byout their growth stages. FYM contributes organic matter, essential nutrients, & beneficial microorganisms to the soil,there by improving soil structure, fertility, and microbial activity.This not only ensures the sustained health of the soil but also promotes the efficientutilization of nutrients by wheat crop.

The significantly higher wheat yields obtained with the recommended treatment further validate its effectiveness. By providing adequatenitrogen by both chemical fertilizer and FYM, the crop receives a balanced and continuous supply of nutrients, ensuring optimal growth and development. Additionally, the synergistic effects of chemical and organic inputs contribute to improved soil health and overall sustainability of agricultural systems.

The application of 100% RDN along with 25% nitrogen by FYM emerges as a promising approach for wheat growers to sustain soil health and achieve higher yields. This integrated nutrient management strategy not only enhances crop productivity but also supports long-term soil fertility and environmental sustainability.

Table 1 wheat Plant measrement (cm) as influenced by integrated nutrient management

TREATMENT apply	**Plant height (cm) DAS**				
	30	**60**	**90**	**120**	**At harvest**
T_1.25%RDN+75%N by FYM	18.61	37.58	70.41	79.31	85.81
T_2.50%RDN+50%N by FYM	20.72	40.17	73.27	83.74	90.09
T_3.75%RDN+25%N by FYM	21.65	43.24	77.66	86.82	94.69
T_4.100%RDN+25%N by FYM	24.02	46.36	82.77	92.36	101.15
T_5.100%RDN	23.85	46.01	81.54	91.41	100.29
T_6.125%RDN	23.98	46.25	82.60	92.10	100.98
T_7.Control	12.98	21.24	42.14	49.73	53.65
SEm+	0.66	0.77	0.94	0.96	1.10
CD5%	1.90	2.26	2.77	2.93	3.33

Table 2 Dry matter accumulation shows changes of integrated nutrient management on (g m^{-1}) row length of wheat

Treatments apply	**Dry Matter Accumulation (g m^{-1})**				
	30	**60**	**90**	**120**	At harvest

T_1.25%RDN+75%NByFYM	8.06	46.29	143.27	185.12	192.13
T_2.50%RDN+50%NByFYM	9.01	53.15	151.37	195.29	206.01
T_3.75%RDN+25%NByFYM	10.01	59.17	160.75	207.53	218.15
T_4.100%RDN+25%NByFYM	11.20	66.76	174.94	223.38	238.14
T_5.100%RDN	11.06	65.70	171.74	220.10	235.08
T_6.125%RDN	11.15	66.60	174.10	222.70	237.50
T_7.Control	5.83	19.24	38.54	50.09	55.30
SEm+	0.25	1.14	2.41	3.04	3.33
CD5%	0.71	3.37	7.14	9.03	10.04

Table 3: Wheat yield attributes as influenced from integrated nutrient management

Treatment apply	No. tillers effectedmetre^{-1} row length	Length ofSpike (cm)	Grain contain by per spike	weight (g)
T_1.25%RDN+75%N ByFYM	79.31	10.95	42.71	35.65
T_2.50%RDN+50%N ByFYM	88.02	11.14	43.48	36.88
T_3.75%RDN+25%N ByFYM	94.03	11.24	44.56	38.36
T_4.100%RDN+25%N ByFYM	101.70	11.36	45.42	39.85
T_5.100%RDN	100.66	11.28	45.12	39.64
T_6.125%RDN	101.45	11.34	45.28	39.75
T_7.Control	53.35	8.51	36.21	34.49
SEm+	1.24	0.13	0.82	0.28
CD5%	3.73	0.40	2.49	0.86

Table 4: yield of straw and grain of wheat as affected from integrated nutrient management

Treatments	Grain (kg ha^{-1})	Straw (kgha^{-1})	Biological (kgha^{-1})	index of harvest (%)
T_1.25%RDN+75%N byFYM	4369	5827	10198	42.85
T_2.50%RDN+50%N byFYM	4797	6355	11154	43.00
T_3.75%RDN+25%N byFYM	5199	6839	12038	43.16
T_4.100%RDN+25%N byFYM	5710	7416	13093	43.62
T_5.100%RDN	5588	7289	12975	43.06
T_6.125%RDN	5665	7405	13070	43.35
T_7.Control	2185	2933	5118	42.70
SEm+	74	94	146	0.40
CD 5%	219	278	434	NS

References

[1]. Ashraf,M.Y.,Ala,S.A.,&Bhatti,A.S.(1998).Nutritionalimbalancein wheat (Triticumaestivum L.) genotypes grown at soil water stress. Acta physiologiae plantarum, 20, 307-311.

[2]. Hati,K.M.,Mandal,K.G.,Misra,A.K.,Ghosh,P.K.,&Bandyopadhyay,K. K. (2006). Effect of inorganic fertilizer and farmyard manure on soil physical properties,rootdistribution,andwater-useefficiencyofsoybeaninVertisolsof central India. Bioresource technology, 97(16), 2182-2188.

[3]. Zhang,H.,&Oweis,T.(1999).Water–yieldrelationsandoptimalirrigation scheduling of wheat in the Mediterranean region. Agricultural water management, 38(3), 195-211.

[4]. Kulkarni, M. V., Patel, K. C., Patil, D. D., & Pathak, M. (2018). Effect of organicandinorganicfertilizersonyieldandyieldattributesofgroundnut and wheat. International J. of Chemical Studies, 6(2), 87-90.

[5]. NajafiMirak,T.,Moayedi,A.A.,Sasani,S.,&Ghandi,A.(2019). Evaluation of adaptation and grain yield stability of durum wheat (TriticumturgidumL.)genotypesintemperateagro-climatezoneofIran. IranianJournalofCropSciences,21(2),127-138
[6]. Ashraf,M.Y.,Ala,S.A.,&Bhatti,A.S.(1998).Nutritionalimbalancein wheat (Triticum aestivum L.) genotypes grown at soil water stress. Actaphysiologiae plantarum, 20, 307-311.
[7]. Singh,R.A.,Singh,I.P.,Rajesh,R.,Singh,J.,&Jaiswal,V.B.(2014). Performance of new summer groundnut varieties in different agro-climatic zonesofUttarPradesh.AdvanceResearchJournalofCropImprovement,5(2), 158-161.
[8]. Wu, W., & Ma, B. (2015). Integrated nutrient management (INM) for sustainingcropproductivityandreducingenvironmentalimpact:Areview. Science of the Total Environment, 512, 415-427.
[9]. Patyal, A., Shekhar, C., Sachan, R., Kumar, D., Yadav, A., & Kumar, G. (2022).Effectofintegratednutrientmanagement(INM)ongrowthparameters and yield of wheat (Triticum aestivum L.). International Journal of Plant & Soil Science, 34(22), 962-967.
[10]. Anonymous (2017). Agricultural Statistics at a Glance. Ministry of Agriculture, Govt. of India, New Delhi. .
[11]. Devi, K. N., Singh,M.S.,Singh,N.G.,&Athokpam,H.S.(2011).Effectof integrated nutrient management on growth and yield of wheat (Triticum aestivum L.). Journal of Crop and Weed, 7(2), 23-27.
[12]. Patel G.G., Sadhu A.C., Patel H.K., Shan S.N. and Lakum Y.C. (2018). Effect of organic and inorganic fertilizers in comparison with humic acid on growth and yield of wheat (Triticum aestivumL.). International Journal of Agriculture Sciences, 10, 6524-6527.