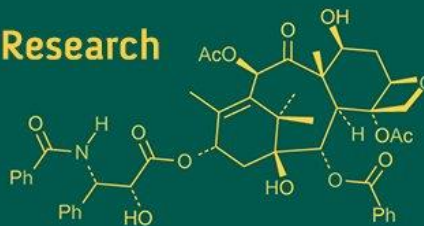


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Effect of integrated nutrient management practices on growth and yield of wheat (*Triticum aestivum* L.)

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Abstract

A field experiment was conducted at Agronomy farm, School of Agriculture, Suresh Gyan Vihar University, Jaipur (Rajasthan) during *Rabi*, 2025-26 in loamy sand soil with objective to study the “Effect of Integrated Nutrient Management Practices on Growth and Yield of Wheat (*Triticum aestivum* L.)”. The eight treatments were tested in randomized block design with three replications. The maximum grain, straw and biological yield, net return and B : C ratio were recorded under the application of 50% RDN + 50% N through neem cake + Jeevamrut (500 L ha⁻¹), which remained statistically at par with 50% RDN + 50% N through neem cake + NP consortium and 75% RDN + 25% N through neem cake + Jeevamrut (500 L ha⁻¹).

Keywords: *Triticum aestivum* L., integrated nutrient management, neem cake, Jeevamrut

Introduction

India is self-sufficient in catering to the needs of major food staples like rice and wheat. On an average, wheat contributes to around 35% of total food grain production and 21% of cultivated area in the country (Arora *et al.*, 2024). In India, wheat (*Triticum aestivum* L.) is the second most important cereal crop after rice and pre-dominant winter season crop of north-western plains zone. Wheat is grown on 32.76 million hectares (m ha) lands with total production of 117.51 million tons (m t) contributes 34 percent of the total food grain production in the country with the productivity of 3587 kg ha⁻¹ (Ministry of Agriculture, GOI 2023-24). Wheat Productivity has to be raised to meet ever increasing food demand in the country. In Rajasthan area under wheat crop is 2.74 m ha with production of 9.70 m t and productivity of 3540 kg ha⁻¹ (Ministry of Agriculture, GOR, 2023-24). Application of jeevamrut in agriculture is a good option to supplement nutrient requirement of crops as it is easy to prepare, cost effective, easily available and eco-friendly. It is considered to be an excellent source of natural carbon, biomass, nitrogen, phosphorus, potassium, etc. like the other forms of manure, compost and vermicompost” (Sharma *et al.*, 2024) ^[1]. “Jeevamrut established to be significant because it maintains the fertility of soil and also helps in enhancement of growth and development of plants. Jeevamrut also comes in one of the low-cost formulations which are responsible for the enhancement of soil with indigenous microorganisms required for better mineralization of soil and its helps in enhancement of growth of plant” (Singh and Lal, 2019) ^[9]. Devakumar *et al.*, (2008) ^[2] has found the presence of many beneficial microorganisms viz., nitrogen fixers, phosphorus solubilizers, actinomycetes and fungi in jeevamrut and beejamrut. Usage of jeevamrut along with other manures can also prove to be beneficial. The main constraint in the organic farming of wheat is the 20-40% low yield of wheat in comparison to conventional farming which may be attributed to lack of supply of nutrient by organic sources as per requirement of wheat plant at different growth stages. Besides use of FYM, vermicompost, neem cake, green manures, biodynamic manures, phosphate rich organic manures; application of jeevamrut, Panchagavya and matakakhad is being practiced in organic farming of crops for improving the crop yield and better soil health (Yadav *et al.* 2020) ^[11].

Method and Materials

The experiment was conducted during *rabi* 2025-26 at Agronomy farm, School of Agriculture, Suresh Gyan Vihar University, Jaipur.

Geographically, the study area is located at 75°48'84" E longitude and 26°82'47" N latitude and this region falls under agro-climatic zone III A (Semi-arid Eastern Plain Zone) of Rajasthan. The experiment consisting eight treatments control, 100% RDN, 75% RDN + 25% N through Neem Cake, 50% RDN + 50% N through Neem Cake, 75% RDN + 25% N through neem cake + NP consortium, 75% RDN + 25% N through neem cake + Jeevamrut (500 lit/ha), 50% RDN + 50% N through neem cake + NP consortium and 50% RDN + 50% N through neem cake + Jeevamrut (500 lit/ha). The total eight treatment combinations were tested in randomized block design with three replications.

Results and Discussion

The treatment 50% RDN + 50% N through neem cake + Jeevamrut (500 L ha⁻¹) produced the maximum grain, straw and biological yield, which was statistically at par with 50% RDN + 50% N through neem cake + NP consortium, 75% RDN + 25% N through neem cake + Jeevamrut (500 L ha⁻¹) and 75% RDN + 25% N through neem cake + NP consortium. On the basis of treatment, application of 50% RDN + 50% N through neem cake + Jeevamrut (500 L ha⁻¹) resulted in an increase in grain yield by 2.9, 5.9, 7.1, 11.4, 15.3, 18.3 and 39.0 percent over 50% RDN + 50% N through neem cake + NP consortium, 75% RDN + 25% N through neem cake + Jeevamrut (500 L ha⁻¹), 75% RDN + 25% N through neem cake + NP consortium, 50% RDN + 50% N through neem cake, 75% RDN + 25% N through neem cake, 100% RDN and control, respectively. Neem cake acts as a slow-release source of nitrogen and supplies essential secondary and micronutrients, while Jeevamrut enriches the soil with beneficial microorganisms, growth-

promoting substances and enzymes that improve nutrient mineralization and availability. Singh *et al.* (2025) [8] concluded that integrated nutrient management practices combining organic manures, biofertilizers and reduced inorganic nitrogen improved wheat productivity, nutrient use efficiency and soil biological health over conventional fertilizer application alone. These findings strongly support the results of the present investigation, highlighting that the combined use of neem cake and Jeevamrut is an effective and sustainable nutrient management strategy for maximizing wheat yield while improving soil health (Sharma and Tomar 2025) [6]. The harvest index of wheat was not significantly affected by the different integrated nitrogen management treatments. The harvest index ranged from 42.91 to 45.16 percent, indicating only marginal variation among the treatments (Yadav *et al.* (2025) [12]. The maximum gross return (₹177,080 ha⁻¹) and net return (₹117,549 ha⁻¹) were recorded under the application of 50% RDN + 50% N through neem cake + Jeevamrut (500 L ha⁻¹), which remained statistically at par with 50% RDN + 50% N through neem cake + NP consortium (gross return ₹170,603 ha⁻¹ and net return ₹110,972 ha⁻¹) and 75% RDN + 25% N through neem cake + Jeevamrut (500 L ha⁻¹) (gross return ₹170,568 ha⁻¹ and net return ₹114,606 ha⁻¹). The highest B:C ratio (3.05) was recorded under the application of 75% RDN + 25% N through neem cake + Jeevamrut (500 L ha⁻¹), which was closely followed by 50% RDN + 50% N through neem cake + Jeevamrut (500 L ha⁻¹) (2.97), 75% RDN + 25% N through neem cake + NP consortium (2.97) and 100% RDN (2.95). This might be due to the high wheat yield obtained and the minimum cost of cultivation. These results are in conformity with the finding of Singh *et al.* (2017) [10] and Patrick *et al.* (2024) [5].

Table 1: Effect of integrated nutrient management practices on yield

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	HI (%)
Control	3677	4464	8141	45.16
100% RDN	4320	5557	9877	43.74
75% RDN + 25% N through Neem Cake	4433	5708	10142	43.72
50% RDN + 50% N through Neem Cake	4589	5965	10554	43.48
75% RDN + 25% N through neem cake + NP consortium	4773	6317	11090	43.04
75% RDN + 25% N through neem cake + Jeevamrut (500 lit/ha)	4827	6425	11252	42.91
50% RDN + 50% N through neem cake + NP consortium	4967	6517	11483	43.25
50% RDN + 50% N through neem cake + Jeevamrut (500 lit/ha)	5111	6632	11743	43.52
SEm±	148	187	328	0.33
CD = 0.05%	448	566	995	1.00

Table 2: Effect of integrated nutrient management practices on economics (Rs/ha)

Treatments	Economics (Rs/ha)		
	Gross return	Net return	B : C ratio
Control	129738	80638	2.64
100% RDN	150569	99607	2.95
75% RDN + 25% N through Neem Cake	148735	93738	2.70
50% RDN + 50% N through Neem Cake	161935	102904	2.74
75% RDN + 25% N through neem cake + NP consortium	166518	110456	2.97
75% RDN + 25% N through neem cake + Jeevamrut (500 lit/ha)	170568	114606	3.05
50% RDN + 50% N through neem cake + NP consortium	170603	110972	2.86
50% RDN + 50% N through neem cake + Jeevamrut (500 lit/ha)	177080	117549	2.97
SEm±	3619	3619	0.07
CD = 0.05%	10978	10978	0.22

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