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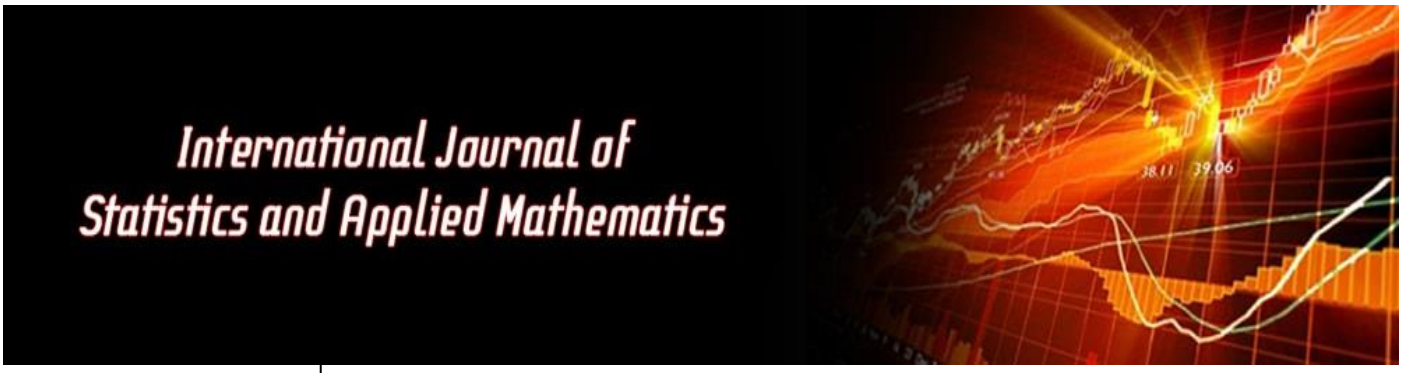

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Effect of Nano urea & Mono ammonium phosphate on yield and economics of wheat (*Triticum aestivum* L.)

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Abstract
The experiment was carried out in the School of Agricultural Sciences, Crop Research Cafeteria, G.H. Raisoni University, Chhindwara (M.P.). With six treatments and three replications, the experiment was set up using the Randomized Block Design (RBD) method. The treatment detail is T_1 100% RDN + 1 spray of nano urea at tillering stage, T_2 100% RDN + 1 spray of mono ammonium phosphate at tillering stage, T_3 75% RDN + 1 spray of nano urea at tillering & jointing stage + 1 spray of mono ammonium phosphate at tillering & jointing stage, T_4 100% RDN + plain water spray at tillering & jointing stage, T_5 75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate + plain water at tillering stage and T_6 Control + 50% RDN + plain water spray at tillering & jointing stage. The production and economics of wheat were significantly impacted by the combined use of nano urea and mono ammonium phosphate. The application of 75% RDN plus one nano urea spray, one mono ammonium phosphate spray, and plain water had a considerable favorable impact on grain yield (Kg ha^{-1}), straw yield (Kg ha^{-1}), gross monetary return (Kg ha^{-1}), net return (Kg ha^{-1}), and B:C ratio, according to the data.

Keywords: Wheat, nano urea, yield and economics

Introduction
The Poaceae family and Triticum genus are the home to the common grain crop known as wheat (*Triticum aestivum* L.). The most important cereal crop in the world, it supplies 30% of all cereal meals produced globally and is a staple food for nearly 10 billion people in 43 countries. It has been grown on the Indian subcontinent since the beginning of recorded history and is crucial to the nation's economy and food security. Worldwide, 20% of all dietary calories and nearly 55% of all carbs are derived from wheat.
India produces 109.52 m t of wheat on 31.61 m ha of land in 2020–21, with a national average productivity of 3.46 t hal. Wheat is a significant rabi season grain crop in Madhya Pradesh. One significant crop grown in Chhattisgarh is wheat, and the state's farming system is heavily dependent on rainfall. Wheat is grown on 227 (000 ha) of land in Chhattisgarh, with an annual yield of 1.6 t hal.
The process through which plants produce a variety of crucial chemicals and compounds, such as amino acids, enzymes, DNA, RNA, and chlorophyll, depends on nitrogen, which is an essential ingredient for plant growth. It must be present in sufficient quantities for plants as it is essential for crop development, strong growth, and overall greenness. Mono ammonium phosphate (MAP), commonly known as ammonium dihydrogen phosphate (ADP), is a chemical substance. By weight, mono ammonium phosphate is used most frequently in agriculture as a component of fertilizers. It provides soil with nitrogen and phosphorus in a form that plants can use. It is a water-soluble fertilizer that contains a high phosphorus content as well as the ideal level of N. Since it is readily soluble in water, it works well for drip irrigation and the application of foliar fertilizer.
A viable substitute for assuring high agricultural output while being ecologically friendly is nano fertilizers. Liquid nano fertilizer is currently the greatest replacement for traditional urea fertilizer. Compared to conventional urea and phosphorous, which are a major source of raw materials in industries producing a wide range of products used in life, foliar applications of nano urea and mono ammonium phosphate liquid at critical crop growth stages of a plant effectively fulfill its nitrogen and phosphorus requirement and increase crop productivity and quality. Oil seeds also have medicinal and medical advantages.

After Canada, India is the second-largest linseed producer in the world, producing 1.21 lakh tons of linseed annually on an area of 2.0 lakh ha with a productivity of 605 kg/ha. India has 18.8% of the world's reported linseed acres but produces less than 10% of the world's linseed.

Farmyard manure appears to have a direct effect on crop yields, either by combining all of these processes, or by accelerating the respiratory process while also increasing cell permeability and hormone-driven growth. It provides plants with readily available forms of micronutrients such as Fe, S, Mo, and Zn, as well as nitrogen, phosphorus, and potassium through biological breakdown. Additionally, it enhances soil aeration, aggregation, permeability, water-holding capacity, delayed nutrient release, cation exchange capacity, stimulation of soil flora and fauna, among other things. of the soil's physical-chemical properties. Its average N, P, and K percentages are 0.50, 0.17, and 0.55, respectively.

Nitrogen is the most crucial nutrient among all others since it participates in all processes involving protoplasm, enzymatic reactions, and photosynthesis and is a component of protein, enzymes, and chlorophyll. Linseed has been shown to have a variety of contradictory reactions to N. Strong vegetative growth and a deep green color are signs of an adequate nitrogen supply. The increased leaf area ensures improved growth, development, plant vigor, and yield since it encourages cell division and cell expansion.

Regarding the integrated nutrient management of nutrients in linseed, very little information is known. The purpose of the current work was to ascertain how FYM and key nutrients affected the growth and yield of linseed (*Linum usitatissimum* L.).

Material and Methods

The current study, "Effect of Nano urea & Mono ammonium phosphate on yield and economics of wheat (*Triticum aestivum* L.)," was conducted in the Rabi growing season of 2022 at the Crop Research Cafeteria, School of Agricultural Sciences, G.H. Raisoni University, Chhindwara (M.P.). In this chapter, the specifics of the materials utilized in the experimentation and the methods used during the course of the study are discussed. Additionally discussed are the specifics of both the laboratory-based chemical analysis and the field observations that were made. At the GH Raisoni University meteorological observatory, during the crop growth period from 6 November 2022 to 10 March 2023, meteorological data including location, climate, maximum and minimum temperatures, mean relative humidity, rainfall, and evaporation were recorded. The data shows that during *Rabi* 2022 crop growth period, there was rainfall of 59.00 mm during that season. Experimental field's soil characteristics. The field's topography was homogeneous, had a gradual slope, and had good drainage systems. Before the crop was planted, a random soil sample was taken from the experimental field at a depth of 15 cm. These samples were combined to create a composite soil sample for chemical analysis.

Grain yield (kg ha^{-1})

The grain yield per net plot was computed after the produce was winnowed and sun-dried in a double pan balance. The grain yield kg ha^{-1}was then calculated by multiplying the grain yield of each plot by the appropriate conversion factor.

Straw yield (kg ha^{-1}): The biological yield (bundle weight) of the same plot was subtracted from the economic yield (grain yield) to get the straw yield. By multiplying this amount by the conversion ratio used for grain yield kg/ha, it was afterwards converted to straw yield kg/ha.

Harvest index (%)

It refers to the percentage expression under a specific treatment of the relationship between the economic yield (grain yield) and the biological yields (grain + straw yields). The following formula was used to calculate it for each plot.

$$\text{Harvest index (\%)} = \frac{\text{Economic yield (kg ha}^{-1})}{\text{Biological yield (kg ha}^{-1})} \text{ x } 100$$

Net return and B-C ratio

The results were then displayed on a per-hectare basis according to treatments by multiplying the total grain and straw production by the pertinent market values. The net return was estimated by subtracting the treatment-specific gross return from the total cultivation cost. Net return (' ha-1) is the result of subtracting cultivation costs (' ha-1) from the gross return (' ha^{-1}).

$$\text{B-C ratio} = \frac{\text{Net return (ha)}}{\text{Total cost (ha)}}$$

Result and Discussion

The findings of the current investigation, together with pertinent commentary, have been compiled under the following headings.

Grain yield (q/ha)

The data in Table 1 relates to the harvest index (%), stover yield (kg/ha), and seed yield (kg/ha). the correlation between a range of growth and yield indicators, including crop dry matter accumulation, plant density, and test weight. T3 outperformed all other treatments except T1 substantially, recording the best grain yield (47.82 q/ha), highest straw yield (71.16 q ha-1), and highest harvest index (36.87%). The T6 treatment, which employed 75% RDN together with one spray of nano urea at the tillering and jointing stage and one spray of mono ammonium phosphate, had the lowest grain yield (28.44 q/ha).

The application of 75% RDN with one spray of nano urea at the tillering and jointing stage and one spray of mono ammonium phosphate at the tillering and jointing stage (T3) resulted in a significantly greater maximum grain and straw yield than the other treatments. These results provide support for the findings of Afify *et al.* (2019) [3], Kumar *et al.* (2021) [2], Sumui *et al.* (2022) [4], Rawate *et al.* (2022) [5], and Poudel *et al.* (2023) [6].

Effect on economics

By deducting the cost of cultivation from each treatment's individual gross monetary returns (GMR), the net monetary returns for each strategy were calculated. The values for each treatment that were thus obtained are shown in Table 2. The data clearly show that under T6 (Control + 50% RDN + plain water spray at tillering & jointing stage), NMR was at a minimum (40465Rs/ha).When various nutrients were applied, it was, nevertheless, elevated. Under 75% RDN + 1 spray of nano urea at tillering & jointing stage + 1 spray of mono ammonium phosphate at tillering & jointing stage (T3), the NMR was at its highest (81230 Rs/ha).

Table 1: Effect of integrated nutrient management on grain, straw yield ha^{-1}, harvest index of wheat

T. No.	Treatments	Grain yield (q/ha)	Straw yield (q/ha)	HI (%)
T_1	100% RDN + 1 spray of nano urea at tillering stage	43.37	66.34	39.53
T_2	100% RDN + 1 spray of mono ammonium phosphate at tillering stage	39.21	61.89	38.78
T_3	75% RDN + 1 spray of nano urea at tillering & jointing stage + 1 spray of mono ammonium phosphate at tillering & jointing stage	47.82	71.16	40.19
T_4	100% RDN + plain water spray at tillering & jointing stage	35.59	53.84	39.80
T_5	75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate + plain water at tillering stage	41.53	64.27	39.25
T_6	Control + 50% RDN + plain water spray at tillering & jointing stage	28.44	48.69	36.87
	S.Em±	1.65	1.64	0.24
	CD (P=0.05)	4.65	4.93	0.72

Benefit-cost ratio

It refers to the net financial gain for each rupee invested under a specific treatment. The impact of the various therapies on the benefit-cost ratio is depicted in Table 2. The data clearly show that the B:C ratio was lowest (1.63) when Control + 50% RDN + plain water spray was applied at the tillering and jointing stage (T6) and maximum (2.95) when 75% RDN + 1 spray of nano urea at the tillering and jointing stage + 1 spray of mono ammonium phosphate at the tillering and jointing stage (T3) was applied. The second maximum (2.60) and its remaining treatments were registered by T1 application.

Table 2: Effect of integrated nutrient management on economic analysis of wheat

T. No.	Treatments	Cost of cultivation	Gross monetary returns	Net monetary returns	B:C
		……..Rs/ha……..			
T_1	100% RDN + 1 spray of nano urea at tillering stage	27468	98795	71327	2.60
T_2	100% RDN + 1 spray of mono ammonium phosphate at tillering stage	27668	89510	61842	2.24
T_3	75% RDN + 1 spray of nano urea at tillering & jointing stage + 1 spray of mono ammonium phosphate at tillering & jointing stage	27504	108734	81230	2.95
T_4	100% RDN + plain water spray at tillering & jointing stage	27368	81013	53644	1.96
T_5	75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate + plain water at tillering stage	27404	94678	67274	2.45
T_6	Control + 50% RDN + plain water spray at tillering & jointing stage	24839	65304	40465	1.63

Data indicates that during the tillering and jointing stage (T6), the net returns and B:C were at their lowest under control + 50% RDN + simple water spray. While gross returns, net returns, and B:C were at their highest under 75% RDN + 1 spray of nano urea at tillering & jointing stage + 1 spray of mono ammonium phosphate at tillering & jointing stage, the maximum cost was recorded under T3 where 100% RDN + 1 spray of mono ammonium phosphate at tillering stage. The findings of Kannoj *et al.* (2022) [1] and Kumar *et al.* (2021) [2] provide strong support for the conclusions.

Conclusion

According to the results of a one-year experiment, the application of 75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate + plain water, respectively, in the Chhindwara region of Madhya Pradesh will produce the highest yield and benefit: cost ratio from wheat crop.

References

1. Choudhary KJ, Jain D, Tomar M, Patidar R, Choudhary R. Effect of Nano Urea vs Conventional Urea on the Nutrient Content, Uptake and Economics of Black Wheat (*Triticum aestivum* L.) along with Biofertilizers. Biological Forum – An International Journal. 2022;14(2a):499-504.
2. Kumar KA, Kumar Y, Savitha AS, Kumar MY, Narayanswamy RR, *et al*. Effect of IFFCO Nanofertilizer on Growth, Grain Yield and Managing *Turcicum* Leaf Blight Disease in Maize; International journal of plant and soil Science. 2021;33(16);19-28.
3. Afify RR, El-Nwehy SS, Bakry AB, Abd El-Aziz ME. Response of peanut (*Arachis hypogaea* L.) crop grown on newly reclaimed sandy soilto foliar application of potassium nanofertilizer. Middle East J Appl. Sci. 2019;9(1):78-85.
4. Sumui S, Sagar L, Sankar T, Manohar A, Adhikarv R, Maitra S. Growth and productivity of *rabi* maize as influenced by foliar application of urea and nano-urea Crop Research. 2022;57(3):136-140.
5. Rawate D, Patel JR, Agrawal AP, Agrawal HP, Pandey D, Patel CR, *et al*. Effect of nano urea on productivity of wheat (*Triticum aestivum* L.) under irrigated condition. The Pharma Innovation Journal. 2022;11(9):1279-1282.
6. Poudel A, Singh SK, Ballesta RJ, Jatav SS, Patra A, Pandey A. Effect of Nano-Phosphorus Formulation on Growth, Yield and Nutritional Quality of Wheat under Semi-Arid Climate. Agronomy. 2023;13:768.