Plant Archives Vol. 24, Special Issue (GABELS), 2024 pp.203-209 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2024.v24.SP-GABELS.031

EFFECT OF MICRONUTRIENTS IN CONJUNCTION WITH FYM ON NUTRIENT CONTENT AND THEIR UPTAKE BY LATE SOWN WHEAT

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ABSTRACT

This study was carried out at the Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut-250110 over two consecutive winter (Rabi) seasons (2018-19 and 2019-20). Sandy loam made up the soil of the experimental field, which reacted slightly alkaline. A low concentration of nitrogen, was found in the soil, but it was medium in phosphorus, potassium, zinc, manganese and iron that could be extracted using the DTPA method. Nine treatments were included in the experiment. It was designed as a randomized block design with three replications. Nutrient content and uptake was improved with the combined application of micronutrients along with FYM and RDF. Soil fertility level in respect to applied nutrients and other chemical properties of soil was improved with the soil application of zinc, iron and manganese along with FYM and RDF. The highest net return and B: C ratio were obtained in T_7 (RDF + Zn @ 5.0 kg ha^{-1} + 5 ton FYM ha^{-1}). Thus, balanced nutrients application through micronutrients along with organic manure and recommended dose of fertilizers a better method of improving wheat cultivation has been found including the soil fertility.

Keywords: Soil Fertility, FYM, RDF, Micronutrients, Experiment.

Introduction

Wheat (*Triticum aestivum* L.) is the world's most widely consumed cereal and the second most important grain after rice. Wheat provides more than 4.5 billion people in 94 countries with 20% of their dietary calories and 20% of their protein. The world's wheat crop covers 215.48 million hectares, yielding 731.4 million metric tons with an average productivity of 3390 kg/ha^{-1} (USDA report, 2019). Wheat also plays a vital part in food and nutritional security in India, with an area of 29.65 million hectares and an output of 99.9 million metric tons with an average productivity of 3371 kg/ha^{-1} (USDA report, 2019). Wheat accounts for approximately a third of total food grain production. The current global population of 7.7 billion people is predicted to grow to 9.7 billion people by 2050. Recently, India is the second most populous country (1.3 billion) after China (1.41 billion) and expected to surpass that of China in roughly seven years and touching a peak 1.7 billion by 2050 (The UN World Population Prospects: The 2019 Revision). Accordingly, wheat is likely to continue to be vital in ensuring food security across the globe. Crops and cultivars within a crop often differ in yielding capacity, nutrient requirements, and nutrient uptake efficiency, making general fertilizer recommendations difficult to formulate. Zinc and iron deficiency are common in both temperate and tropical regions, and they represent a barrier to meeting productivity targets in various crops. Wheat (*Triticum aestivum* L) suffers from considerable yield loss when cultivated in micronutrient-deficient soils. The amount of loss is dependent on the amount of micronutrients in the soil and the variety employed (Bansal *et al.,* 1998).

Furthermore, micronutrient deficits, notably Zn, Fe, and Mn, are difficult to treat since soil-applied fertilizers for these elements have a low efficacy due to their quick oxidation. Micronutrient fertilization, whether in the soil or on the plant, has undoubtedly become vital in reducing deficits and improving production, but it is also costly. Growing wheat cultivars that are more effective under Zn, Fe and Mn stress conditions is another strategy to boost productivity on Zn, Fe and Mn deficient soils. This needs a thorough assessment of genetic variability in newly released wheat varieties in terms of Zn, Fe and Mn absorption efficiency. Wheat breeders could utilize this fundamental knowledge to develop varieties that are suited to a specific soil type. Furthermore, wheat genotypes differ significantly in their sensitivity to Zn, Fe and Mn deficiency. In the world, more than half of the population, primarily in developing countries, is malnourished due to micronutrient deficiencies (Alloway, 2008).

FYM is our country's primary supply of organic matter, as well as a source of primary, secondary, and micronutrients for plant growth. It provides a consistent supply of energy for heterotrophic bacteria and aids in improving nutrient availability and crop quality. The complete amount of nutrients included in farmyard manure is not immediately available, but roughly 30% of nitrogen, 60–70% phosphorus, and 70% potassium are available to the first crop, with the remaining nutrients available to the following crop (Kaihura, 1999). The use of FYM also improved the availability of plant nutrients in the soil. While FYM combined with Zn, Fe, and Mn improved soil chemical, biological, and physical qualities, it also boosted the uptake of lacking nutrients. FYM is a nutrient storehouse that contains all essential plant nutrients. It is advantageous to use fertilizers such as Zn, Fe and Mn in conjunction with FYM (Nawab *et al.,* 2011). Overcoming nutrient deficiency and enhancing nature instead of destroying it. The best way to maintain soil, plant and animal health is to use organic sources of nutrients, giving all living things the opportunity to live and benefit from their beneficial activities, such as nitrogen fixation, phosphorus solubilization and recycling of animal waste. Therefore, this study was conducted.

Material and Methods

Experimental Site

At the Crop Research Centre (CRC) farm of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut-250110, Uttar Pradesh, India. The study was conducted during the Rabi seasons of 2018-2019 and 2019-2020. The field underwent thorough levelling and was irrigated using a tube well. The research field was located at Crop Research Centre (CRC), Chirodi which is about two kilometers away from 3rd milestone of Daurala to Sardhana Road, Meerut.

Description of Variety under Investigation

As part of the release of verities for agricultural crops in 2013 by the central sub-committee on crops standards and notifications, wheat variety DBW-71 was developed and released for late sown cultivation in the North Western Plain Zone (NWPZ) of India. Besides having an average yield of 43.2 q ha^{-1}, it has a potential yield of 68.9 q ha^{-1} and is more suitable for cultivation after basmati rice, sugarcane, cotton, vegetable peas and potato. As a result of its greater ability to withstand terminal heat stress, DBW 71 yields more under very late sown conditions. DBW 71 showed high levels of resistance to the 78S84 patho type of stripe rust at both adult and seedling stages according to race-specific APR response analysis and SRT. Aside from having a higher protein content (13.4%), Glu^{-1} score of 10/10, better grain appearance (score 6.2) and hectoliter weight (78.4 kg hl^{-1}), DBW 71 possesses higher quality traits.

Application of fertilizer: In experiment, recommended dose of NPK and micronutrients fertilizer was applied through Urea, DAP, MOP, Zinc Sulphate Monohydrate, Ferrous sulphate and Manganese Sulphate. A half dose of N, a full dose of P and K, and micronutrient fertilizers were administered as a base at the time of sowing. The remaining half of the N was applied in two equal split doses, the first after the first irrigation at crown root initiation and the second before the third irrigation at pre-flowering. According to the treatments, farm yard manure (FYM) was applied before 15 days of sowing.

Detail of treatments and design: Field research was conducted in randomized block design (RBD) with three replications and 09 treatments. RDF was applied uniformly among all the treatments and micronutrients as well as FYM was applied in selected treatments. Applied doses are mentioned below. **A)** N: P: K was applied evenly at a rate of80 kg: 40 kg: 40 kg per hectare in all treatments. **B)** Zn was applied @5.0 kg ha^{-1}**C)** Fe was applied @ 5.0 kg ha^{-1}**D)** Mn was applied @ 5.0 kg ha^{-1}**E)** 5t FYM ha^{-1}

Result and Discussion

Nutrient Content in Grain& Straw: N, P, K and Micronutrients Zn, Fe and Mn content in grain and straw significantly increasedas well as recorded highest with the application of RDF + Zn @ 5 kg ha^{-1} + FYM

5 t ha^{-1} while, Mn content maximum with implementation of RDF + Mn @ 5 kg ha^{-1} + FYM 5 t ha^{-1} and Fe content highest under RDF + Fe @ 5 kg ha^{-1} + FYM 5 t ha^{-1} during both the years with application of RDF + Zn @ 5 kg ha^{-1} + FYM 5 t ha^{-1} (T_7) which produced significantly higher uptake of nutrient than control and statistically at par to RDF + Fe @ 5 kg ha^{-1} + FYM 5 t ha^{-1} (T_8) and RDF + Mn @ 5 kg ha^{-1} + FYM 5 t ha^{-1} (T_9). The nitrogen content in grain and straw differs significantly under various variables. The nitrogen content in grain was more than straw and it ranged from 1.25 to 1.69 and 1.26 to 1.71 % in grain under various treatments while straw nitrogen ranged from 0.22 to 0.62 and 0.24 to 0.64 % during 2018-19 and 2019-20, respectively. The maximum content of nitrogen in both grain and straw was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. The nitrogen content improved over control not only with applied micronutrients along with FYM but also application of micronutrient along with NPK. The phosphorus content in grain and straw differs significantly under various variables and it ranged from 0.16 to 0.34 and 0.17 to 0.35 % in grain under various treatments while straw phosphorus ranged from 0.10 to 0.22 and 0.11 to 0.23 % during 2018-19 and 2019-20, respectively. The maximum content of phosphorus in both grain and straw was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. Phosphorus content in grain and straw was raised by using both organic and inorganic sources. The potassium content in grain and straw differs significantly under various variables. The potassium content in straw was 3 to 4 times more than grain in each treatment. It ranged from 0.28 to 0.45 and 0.29 to 0.47 % in grain under various treatments and in straw from 1.16 to 1.40 and 1.17 to 1.42 % during 2018-19 and 2019-20, respectively. The maximum content of potassium in both grain and straw was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. Both grain and straw revealed higher potassium levels after using organic and inorganic sources. The zinc content in grain and straw differs significantly under various treatments. The zinc content in grain was more than straw and it ranged from 14.75 to 25.86 and 15.30 to 26.52 mg kg^{-1} while straw content from 8.32 to 15.70 and 8.53 to 16.08 mg kg^{-1} during 2018-19 and 2019-20, respectively. The maximum content of zinc in both grain and straw was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. The application of micronutrients along with organic manure and NPK resulted an increment in zinc content compared to micronutrient applied with NPK. The iron content in grain and straw differs significantly under various treatments and it ranged from 29.05 to 41.85 and 29.46 to 42.91 mg kg^{-1} in grain and 152.63 to 181.55 and 153.79 to 183.74 mg kg^{-1} in straw during 2018-19 and 2019-20, respectively under various treatments. The maximum content of iron in both grain and straw was found with application of RDF + Fe @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. The application of micronutrients along with organic manure and NPK improved content of iron in grain and straw. The manganese content in grain and straw differs significantly under various treatments and it ranged from 24.68 to 38.15 and 24.79 to 38.96 mg kg^{-1} in grain and 17.80 to 28.25 and 18.56 to 29.16 mg kg^{-1} in straw during 2018-19 and 2019-20, respectively under various treatments. The maximum content of manganese in both grain and straw was found with application of RDF + Mn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. The application of micronutrients along with organic manure and NPK improved content of manganese in grain and straw. It is generally known that macro and micronutrients are integrated into the soil matrix during the breakdown of organic matter, allowing the soil to act as nutrient reservoirs. These nutrients are released so that they can be absorbed by the plants. Meanwhile, humus, the ultimate component of organic matter breakdown, builds up in environmental systems, increasing soil moisture retention and nutrient supply potential Suganya and Sivasamy (2006). The obtained data are conformed to the results found by Shivay *et al.* (2010), Rawat and Pareek (2003), Khan *et al.* (2009), Reddy *et al.* (2009) and Singh *et al.* (2002) who said that FYM is vital in giving some nutrients that plants require.

Nutrient Uptake in Grain & Straw: N, P, K and Micronutrients Zn, Fe and Mn uptake by grain and straw as well as by biological produce were highest with application of RDF + Zn @ 5 kg ha^{-1} + FYM 5 t ha^{-1} (T_7) which produced significantly higher uptake of nutrient than control and statistically at par to RDF + Fe @ 5 kg ha^{-1} + FYM 5 t ha^{-1} (T_8) and RDF + Mn @ 5 kg ha^{-1} + FYM 5 t ha^{-1} (T_9). Results depicted that more production of biological (grain + straw) yield significantly contributed in gathering of these nutrients in plants (kg/ha^{-1}).The uptake of nitrogen in grain and straw ranged from 31.44 to 73.01, 33.20 to 78.32, 8.08 to 38.94 and 9.24 to 41.75 kg ha^{-1} during 2018-19 and 2019-20, respectively under various treatments. The maximum total uptake 111.94 and 120.07 kg ha^{-1} during 2018-19 and 2019-20, respectively was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} and minimum were observed under control. The potassium content in grain and straw differs significantly under various variables. The potassium content in straw was 3 to 4 times more than grain in each treatment. It ranged from 0.28 to 0.45 and 0.29 to 0.47 % in grain under various treatments and in straw from 1.16 to 1.40 and 1.17 to 1.42 % during 2018-19 and 2019-20, respectively. The maximum content of potassium in both grain and straw was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} during both years. Both grain and straw revealed higher potassium levels after using organic and inorganic sources. The grain zinc uptake ranged from 37.16 to 111.90 and 40.38 to 121.66 and by straw 30.60 to 98.76 and 32.91 to 105.08 g ha^{-1} during 2018-19 and 2019-20, respectively under various treatment combinations. The maximum total uptake 210.66 and 226.74 g ha^{-1} during both years was found with application of RDF + Zn @ 5.0 kg ha-1 + 5 t FYM ha^{-1} followed by RDF + Fe @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} and RDF + Mn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1}.The grain iron uptake ranged from 73.18 to 169.69 and 77.76 to 182.98 and by straw 561.39 to 1098.76 and 593.39 to 1156.93 g ha^{-1} during 2018-19 and 2019-20, respectively under various treatment combinations. The maximum total uptake 1267.73 and 1339.66 g ha^{-1} during both years was found with application of RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} followed by T3, T4, T6, T8 and T9. Manganese uptake by grain and straw varied significantly and ranged from 62.17 to 159.49, 65.43 to 171.59, 65.47 to 174.31 and 71.61 to 184.89 g ha^{-1} during 2018-19 and 2019-20, respectively under various treatment combinations. The uptake of manganese was higher by straw than grain in all treatments during both years. The maximum total uptake 333.80 and 356.49 g ha^{-1} during both years was found with application of RDF + Mn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} followed by RDF + Zn @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1}, RDF + Fe @ 5.0 kg ha^{-1} + 5 t FYM ha^{-1} and RDF + Mn @ 5.0 kg ha^{-1}. The increment in nutrient uptake due to the improved fertility levels would be attributed to the better availability of nutrients and their transport to the plant from the soil. These results were in accordance with the finding of Gupta and Handore (2009), Khan *et al.* (2009), Parihar *et al.* (2005). The positive interaction between Zn, Mn and Fe due to balance nutrition also acts as synergistic effect on nutrient uptake. This was also reported by Khan *et al.* (2009) and Yassen *et al.* (2010). Since nutrient content and uptake enhanced high fertility levels resulted in luxuriant growth and more nutrients being stored in grain and straw, which could enhance nitrogen, phosphorous, potassium, zinc, manganese and iron uptake.

The results tabulated in Tables (1-6) showed effect of micronutrients in conjunction with FYM on nutrient content and their uptake by late sown wheat. It is evident that nutrients content and uptake enhanced significantly due to application of FYM in both seasons.

Table 1 : Effect of micronutrients in conjunction with FYM on nitrogen content and uptake by wheat

Treatments	Nitrogen content (%)				Nitrogen uptake (kg ha^{-1})					
	Grain		Straw		Grain		Straw		Total	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
T_1	1.25	1.26	0.22	0.24	31.44	33.20	8.08	9.24	39.52	42.45
T_2	1.63	1.64	0.56	0.58	56.24	59.86	28.42	31.18	84.66	91.04
T_3	1.65	1.67	0.58	0.60	62.34	65.40	32.29	34.64	94.63	100.04
T_4	1.64	1.65	0.57	0.58	59.27	62.07	30.90	32.15	90.17	94.22
T_5	1.64	1.66	0.58	0.59	60.60	63.41	32.14	33.22	92.74	96.63
T_6	1.66	1.67	0.59	0.61	64.04	67.22	33.55	35.61	97.60	102.82
T_7	1.69	1.71	0.62	0.64	73.01	78.32	38.94	41.75	111.94	120.07
T_8	1.67	1.68	0.60	0.61	67.55	71.47	35.80	37.09	103.35	108.56
T_9	1.68	1.69	0.61	0.63	70.01	74.19	37.52	39.82	107.52	114.01
SEm±	**0.05**	**0.05**	**0.01**	**0.01**	**2.09**	**2.21**	**1.09**	**1.18**	**3.18**	**3.36**
CD at 5%	**0.16**	**0.17**	**0.04**	**0.05**	**6.29**	**6.65**	**3.29**	**3.55**	**9.58**	**10.14**

Table 2: Effect of micronutrients in conjunction with FYM on phosphorus content and uptake by wheat

Treatments	Phosphorus content (%)				Phosphorus uptake (kg ha^{-1})					
	Grain		Straw		Grain		Straw		Total	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
T_1	0.16	0.17	0.10	0.11	4.02	4.49	3.68	4.24	7.71	8.73
T_2	0.25	0.26	0.14	0.15	8.63	9.50	7.11	8.07	15.75	17.57
T_3	0.28	0.29	0.16	0.17	10.60	11.38	8.93	9.84	19.53	21.22
T_4	0.26	0.28	0.15	0.16	9.44	10.58	8.17	8.91	17.60	19.49
T_5	0.27	0.28	0.15	0.17	9.98	10.70	8.32	9.58	18.30	20.28
T_6	0.29	0.30	0.17	0.18	11.20	12.09	9.68	10.52	20.88	22.61
T_7	0.34	0.35	0.22	0.23	14.71	16.06	13.84	15.03	28.55	31.09
T_8	0.31	0.32	0.20	0.20	12.57	13.65	11.92	12.19	24.49	25.84
T_9	0.32	0.33	0.20	0.21	13.38	14.53	12.34	13.32	25.72	27.85
SEm±	**0.01**	**0.01**	**0.01**	**0.01**	**0.74**	**0.81**	**0.66**	**0.72**	**1.40**	**1.53**
CD at 5%	**0.03**	**0.04**	**0.02**	**0.03**	**2.23**	**2.44**	**1.99**	**2.17**	**4.23**	**4.61**

Table 3: Effect of micronutrients in conjunction with FYM on potassium content and uptake by wheat

Treatments	Potassium content (%)				Potassium uptake (kg ha^{-1})					
	Grain		Straw		Grain		Straw		Total	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
T_1	0.28	0.29	1.16	1.17	7.05	7.65	42.67	45.14	49.72	52.80
T_2	0.36	0.37	1.25	1.27	12.43	13.52	63.51	68.87	75.94	82.39
T_3	0.39	0.40	1.30	1.31	14.77	15.70	72.54	75.82	87.31	91.52
T_4	0.38	0.37	1.27	1.26	13.79	13.98	69.14	70.14	82.93	84.12
T_5	0.38	0.39	1.28	1.29	14.05	14.91	70.98	72.67	85.03	87.58
T_6	0.40	0.41	1.32	1.33	15.45	16.52	75.15	77.71	90.60	94.24
T_7	0.45	0.47	1.40	1.42	19.47	21.56	88.07	92.80	107.54	114.36
T_8	0.42	0.44	1.35	1.35	17.03	18.76	80.75	82.29	97.78	101.05
T_9	0.43	0.45	1.37	1.38	17.98	19.82	84.53	87.50	102.51	107.32
SEm±	**0.01**	**0.01**	**0.04**	**0.04**	**1.02**	**1.10**	**4.95**	**5.12**	**5.98**	**6.23**
CD at 5%	**0.03**	**0.04**	**0.13**	**0.14**	**3.08**	**3.32**	**14.91**	**15.44**	**18.0**	**18.76**

Table 4: Effect of micronutrients in conjunction with FYM on zinc content and uptake by wheat

Treatments	Zinc content (mg kg^{-1})				Zinc uptake (g ha^{-1})					
	Grain		Straw		Grain		Straw		Total	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
T_1	14.75	15.30	8.32	8.53	37.16	40.38	30.60	32.91	67.76	73.30
T_2	17.55	18.14	10.62	10.90	60.61	66.28	53.95	58.65	114.57	124.93
T_3	21.24	21.78	12.66	12.97	80.44	85.50	70.65	75.07	151.08	160.56
T_4	18.66	19.15	11.32	11.65	67.72	72.35	61.63	64.85	129.35	137.20
T_5	19.23	19.84	11.90	12.25	71.10	75.83	65.99	69.01	137.09	144.84
T_6	21.68	22.18	13.48	13.82	83.73	89.37	76.74	80.75	160.47	170.12
T_7	25.86	26.52	15.70	16.08	111.90	121.66	98.76	105.08	210.66	226.74
T_8	23.85	24.45	14.45	14.78	96.70	104.26	86.43	90.09	183.13	194.35
T_9	24.56	25.17	15.05	15.42	102.68	110.86	92.86	97.77	195.54	208.63
SEm±	**0.71**	**0.73**	**0.39**	**0.48**	**5.58**	**6.01**	**5.01**	**5.28**	**10.59**	**11.30**
CD at 5%	**2.15**	**2.20**	**1.18**	**1.44**	**16.82**	**18.11**	**15.08**	**15.91**	**31.90**	**34.03**

Table 5 : Effect of micronutrients in conjunction with FYM on iron content and uptake by wheat

Treatments	Iron content (mg kg^{-1})				Iron uptake (g ha^{-1})					
	Grain		Straw		Grain		Straw		Total	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
T_1	29.05	29.46	152.63	153.79	73.18	77.76	561.39	593.39	634.57	671.14
T_2	32.23	32.88	158.02	160.21	111.31	120.14	802.81	862.05	914.12	982.19
T_3	35.68	36.34	164.13	166.32	135.12	142.65	915.90	962.64	1051.03	1105.29
T_4	39.78	40.66	177.23	179.41	144.38	153.62	964.86	998.71	1109.24	1152.33
T_5	34.72	35.36	162.42	164.58	128.37	135.16	900.67	927.14	1029.04	1062.30
T_6	36.20	36.90	166.92	168.24	139.81	148.68	950.29	983.06	1090.10	1131.75
T_7	39.05	39.83	174.67	177.04	168.98	182.73	1098.76	1156.93	1267.73	1339.66
T_8	41.85	42.91	181.55	183.74	169.69	182.98	1085.91	1120.00	1255.60	1302.98
T_9	38.28	38.79	172.59	173.98	160.03	170.84	1064.90	1103.15	1224.93	1273.99
SEm±	**1.25**	**1.28**	**5.72**	**5.49**	**9.68**	**10.35**	**64.62**	**67.27**	**74.29**	**77.61**
CD at 5%	**3.79**	**3.86**	**17.22**	**16.54**	**29.14**	**31.15**	**194.52**	**202.51**	**223.65**	**223.65**

Table 6: Effect of micronutrients in conjunction with FYM on manganese content and uptake by wheat

Treatments	Manganese content (mg kg^{-1})				Manganese uptake (g ha^{-1})					
	Grain		Straw		Grain		Straw		Total	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
T_1	24.68	24.79	17.80	18.56	62.17	65.43	65.47	71.61	127.64	137.04
T_2	27.92	28.12	20.12	20.78	96.43	102.75	102.22	111.81	198.64	214.56
T_3	31.78	32.48	23.02	24.14	120.35	127.50	128.46	139.72	248.81	267.22
T_4	30.50	31.24	22.18	23.05	110.70	118.03	120.75	128.31	231.45	246,34
T_5	36.05	37.16	27.66	28.30	133.28	142.04	153.38	159.42	286.67	301.46
T_6	32.64	33.45	23.76	24.52	126.06	134.78	135.27	143.28	261.33	278.06
T_7	35.50	36.65	26.58	27.48	153.62	168.14	167.20	179.58	320.82	347.72
T_8	34.35	35.20	25.64	26.44	139.28	150.10	153.36	161.17	292.64	311.27
T_9	38.15	38.96	28.25	29.16	159.49	171.59	174.31	184.89	333.80	356.49
SEm±	**1.09**	**1.12**	**0.80**	**0.83**	**8.50**	**9.13**	**9.26**	**9.87**	**17.77**	**19.00**
CD at 5%	**3.30**	**3.37**	**2.42**	**2.51**	**25.60**	**27.49**	**27.88**	**29.71**	**53.49**	**57.21**

Conclusions

In conclusion, the study revealed that wheat cultivar (DBW-71) and120 kg of seed was sown per hectare. Sowing with the split dose of N, full dose of P, K and soil application of Zn, Mn and Fein T_7 (RDF + Zn @ 5.0 kg ha^{-1} + 5 ton FYM ha^{-1}) showed the best result during both the years of experiment. FYM was applied 15 days before sowing according to treatments Nutrient content and their uptake, available nutrient status in soil and economic feasibility were assessed during experiments. Besides improving the Zn, Fe and Mn content of grain and straw, the application of micronutrients also improves the N, P and K content.

Acknowledgement

The successful execution of this research owes its gratitude to several individuals and institutions whose contributions were indispensable. Extend our sincere appreciation to the administration and staff of the Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut-250110, Uttar Pradesh, India provides sustenance for us with necessary infrastructure and advocate for during two consecutive Rabi seasons of 2018-19 and 2019-2020. Their assistance facilitated the smooth conduct of our experiments. I am heartfelt thanks go to the researchers and technicians who dedicated their time and efforts to ensure the accuracy and reliability of our data. Their commitment to excellence greatly enriched the quality of this investigation.

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