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## Effect of organic manures and macro-micro-nutrients on soil health and yield attributes of wheat (*Triticum aestivum* L.) var. M.D. Shri ram super-303+ in an inceptisol of Prayagraj

**Kelin S Johnson, Arun Alfred David, Amreen Hasan, Tarence Thomas and I Srinath Reddy**

### Abstract

Field experiment was conducted during *Rabi* season 2021-22 at Research Farm Department of Soil Science and Agricultural Chemistry, Naini Agricultural Institute, SHUATS, Prayagraj. To study the effects and uses of Organic Manure and Micro-Macro nutrients on wheat there were 9 treatments combinations replicated thrice in  $3_2$  factorial randomized block design with three levels of NPK @ 0,50 and 100%  $ha^{-1}$ , three level of FYM @ 0, 50 and 100%  $ha^{-1}$  and three levels of Zinc @ 0,50 and 100%  $ha^{-1}$  respectively. The results of treatment  $T_9$  [100% (NPK + Zn) + @100%FYM] has impact on soil health, growth and yield of wheat. The observed results after crop harvest were slightly decrease in Bulk density. 1.335  $Mg\ m^{-3}$  (0-15cm) and 1.334  $Mg\ m^{-3}$  (15-30cm), there is a significant increase in pH 7.29 (0-15cm) and 7.28 (15-30cm), EC 0.329  $dS\ m^{-1}$  (0-15cm) and 0.328  $dS\ m^{-1}$  (15-30cm), Particle density 2.427.  $Mg\ m^{-3}$  (0-15cm) and 2.429  $Mg\ m^{-3}$  (15-30cm), OC 0.79% (0-15cm) and 0.72% (15-30cm), Pore space 49.12(0-15cm) and 49.01 (15-30cm), Water holding capacity 47.25% (0-15cm) and 47.20% (15-30cm), Available Nitrogen 262.18kg (0-15cm)  $ha^{-1}$  and 260.89kg  $ha^{-1}$  (15-30cm), Phosphorous 20.32kg  $ha^{-1}$  (0-15cm) and 18.88 kg  $ha^{-1}$  (15-30cm), Potassium 146.63kg  $ha^{-1}$  (0-15cm) and 142.36 kg  $ha^{-1}$  (15-30cm), Available Zn 0.65 mg  $kg^{-1}$  (0-15cm) and 0.66mg  $kg^{-1}$ (15-30cm), regarding to plant growth  $T_9$  [ @100% (NPK+Zn)+@100%FYM] gave the best results with respect to plant height (100 cm), number of tillers plant<sup>-1</sup> (5) No. of grains plant<sup>-1</sup> (60) yield (20.37 q  $ha^{-1}$ ). On the basis of result obtained during present investigation that the application of  $T_9$  [ @100% (NPK+Zn)+@100%FYM] exhibits the significant impact on Soil properties, growth and yield of wheat. The treatment  $T_9$  combination gave the maximum cost benefit ratio of 2.84.

**Keywords:** Wheat, NPK, FYM, zinc, physico-chemical properties of soil, yield attributes and cost benefit ratio etc.

**Abbreviation:** BD-Bulk Density, PD-Particle Density, WHC-Water Holding Capacity, EC Electrical Conductivity, OC-Organic Carbon, N-Nitrogen, P- Phosphorus, K- Potassium

### Introduction

Wheat is originated in India in the year of 1990 B.C. in the Ujjain district of Madhya Pradesh (*Triticum aestivum* L.) (M.D. Shri Ram Super-303+). Wheat occupies number one position. Its importance in India agriculture is second to only rice. Wheat is generally grown for intended food for humans but lesser quantity and more nutrients, the higher producer of Wheat in India is Uttar Pradesh, Madhya Pradesh, Punjab, Rajasthan, Bihar, Haryana, Maharashtra and Gujarat are major wheat growing states in the country. Though the maximum acreage and production of wheat is in Uttar Pradesh but Punjab gives highest average yield per hectare (4332 kg/ha) followed by Haryana (3916 kg/ha). But in Uttar Pradesh the soil is alluvial soil in nature and zinc level is lower compare to other place. to increase the zinc level we have added 100% of  $T_9$ [100% (NPK+Zn)+100% FYM] in given progression which is  $T_9$ [120:60:40+2.5 t  $ha^{-1}$ ] and this has given difference increase in yield ratio and difference increase also in tiller high, grain count, spike length, and crop height. The respond of wheat is also good in this ratio

### Materials and Methods

The experiment was conducted at the Soil Science Research Farm of SHUATS, Prayagraj, U.P., which is located at 25°24, 46°30" North latitude, 81°50'10" East longitude and 98 m above the mean sea level. The soil of experimental area falls in order of *Inceptisol* and

experimental plots is alluvial soil in nature. The Maximum temperature of the location reaches up to 46 °C-48 °C and seldom falls as low as 4 °C-5 °C. The relative humidity ranges between 20-94%. The average rainfall of this area is around 1100mm annually. and the soil which was collected from experiment site was undergo the process of physico-chemical soil parameters listed below: Texture of soil, Bulk density, Particle density, %Pore Space, Water holding capacity, Soil pH, EC, Organic carbon, Available Nitrogen, Available Phosphorus, Available Potassium, Available zinc followed by the scientist Muthuval *et al.*, 1992 for physical analysis and Jackson 1958, Wilcox 1950, Walkley and Black 1947, Subbiah and Asija 1946, Olsen *et al.*, 1954, and Toth and Prince 1949 for chemical analysis.

## Result and Discussion

### Response on soil physical properties

Effects and Uses of Organic Manures and Macro-micro-Nutrients on Soil Health and Yield Attributes of Wheat (*Triticum aestivum* L.) var. M.D. Shri Ram Super-303+ the comparison between Bulk density. T<sub>9</sub> 1.335 Mg m<sup>-3</sup> (0-15cm) and 1.334 m<sup>-3</sup> Mg m<sup>-3</sup> (15-30 cm), in T<sub>1</sub> 1.345 (0-15) and 1.347 (15-30), Particle density T<sub>9</sub> 2.427. Mg (0-15cm) and 2.429 Mg m<sup>-3</sup> (15-30cm), T<sub>1</sub> 2.448 (0-15) and 2.449 (15-30), % Pore space T<sub>9</sub> 49.12% (0-15cm) and 49.01% (15-30cm)

T<sub>1</sub> 42.45% (0-15) and 48.35% (15-30), and Water holding capacity T<sub>9</sub> 47.25% (0-15cm) and 47.20% (15-30cm) T<sub>1</sub> 44.81% (0-15) and 44.79% (15-30). Comparable outcome revealed by Sunil *et al.*, (2018).

### Response on soil Chemical Properties

Effects and Uses of Organic Manures and Macro-micro-Nutrients on Soil Health and Yield Attributes of Wheat (*Triticum aestivum* L.) var. M.D. Shri Ram Super-303+ the comparison between the there is a significant increase in pH T<sub>9</sub> 7.29 (0-15cm) and 7.28 (15-30cm), T<sub>1</sub> 7.23 (0-15cm) and 7.22 (15-30cm). EC T<sub>9</sub> 0.318 dS m<sup>-1</sup> (0-15cm) and 0.315 dS m<sup>-1</sup> (15-30cm). OC T<sub>9</sub> 0.79% (0-15cm) and 0.72% (15-30cm), T<sub>1</sub> 0.57% (0-15cm) and 0.54% (15-30cm). Available Nitrogen T<sub>9</sub> 262.18kg ha<sup>-1</sup> (0-15cm) ha<sup>-1</sup> and 260.89 kg ha<sup>-1</sup> (15-30cm), T<sub>1</sub> 220.8 kg ha<sup>-1</sup> (0-15cm) ha<sup>-1</sup> and 220.62 kg ha<sup>-1</sup> (15-30cm). Phosphorous T<sub>9</sub> 20.32kg ha<sup>-1</sup> (0-15cm) and 18.88kg ha<sup>-1</sup> (15-30cm) T<sub>1</sub> 12.62 kg ha<sup>-1</sup> (0-15cm) and 11.41 kg ha<sup>-1</sup> (15-30cm). Potassium T<sub>9</sub> 146.63kg ha<sup>-1</sup> (0-15cm) and 142.36 kg ha<sup>-1</sup> (15-30cm), T<sub>1</sub> 95.5 kg ha<sup>-1</sup> (0-15cm) and 93.92kg ha<sup>-1</sup> (15-30cm). Available Zinc T<sub>9</sub> 0.65 mg kg<sup>-1</sup> (0-15cm) and 0.66mg kg<sup>-1</sup> (15-30cm), T<sub>1</sub> 0.54 mg kg<sup>-1</sup> (0-15cm) and 0.56 mg kg<sup>-1</sup> (15-30cm). Similar was reported by Cornejo *et al.*, 2008, Elgharably *et al.*, 2011<sup>[5, 8]</sup>.

**Table 1:** Response of Organic manure and Inorganic Fertilizer on Physico-Chemical Properties of Soil

Treat	Depth	BD	PD	%PS	WRC	PH	EC	OC	N	P	K	Zn
T1	0-15	1.345	2.448	48.50	44.81	7.23	0.318	0.57	220.80	12.62	95.5	0.54
	15-30	1.347	2.449	48.35	44.79	7.22	0.315	0.54	220.62	11.41	93.92	0.56
T2	0-15	1.343	2.446	48.55	44.7	7.22	0.321	0.61	230.92	13.85	101.00	0.56
	15-30	1.345	2.447	48.40	44.72	7.21	0.317	0.59	228.95	11.84	102.00	0.57
T3	0-15	1.340	2.443	48.68	44.41	7.20	0.324	0.69	232.12	14.41	103.66	0.57
	15-30	1.341	2.445	48.42	44.45	7.19	0.319	0.65	230.12	12.45	99.68	0.58
T4	0-15	1.342	2.440	48.61	45.72	7.21	0.326	0.62	245.36	16.87	120.75	0.56
	15-30	1.344	2.439	48.50	45.40	7.20	0.321	0.59	243.32	13.97	118.55	0.56
T5	0-15	1.341	2.436	48.70	46.61	7.23	0.328	0.71	250.86	18.03	125.44	0.57
	15-30	1.343	2.438	48.62	45.59	7.22	0.325	0.67	247.64	15.32	122.43	0.58
T6	0-15	1.338	2.442	49.31	46.52	7.24	0.331	0.72	253.62	18.81	129.43	0.58
	15-30	1.342	2.435	48.65	46.50	7.23	0.328	0.68	250.80	15.87	127.56	0.59
T7	0-15	1.339	2.432	48.10	46.15	7.26	0.324	0.66	260.63	20.19	140.55	0.6
	15-30	1.338	2.437	48.78	46.10	7.25	0.321	0.63	257.11	18.55	138.76	0.63
T8	0-15	1.337	2.431	49.05	47.35	7.27	0.327	0.75	263.12	20.76	143.87	0.62
	15-30	1.336	2.435	49.80	46.19	7.26	0.324	0.71	259.52	18.19	140.21	0.64
T9	0-15	1.335	2.430	49.12	47.25	7.29	0.329	0.79	264.18	20.32	146.63	0.65
	15-30	1.334	2.432	49.01	47.20	7.28	0.326	0.72	260.89	18.88	142.36	0.66

## Conclusion

On the basis of findings, it may be concluded that the treatment combinations of T<sub>9</sub> (@100% (NPK+Zn) +@100% FYM) shows best results with respect to in comparison to other treatment combinations. Compaction was decrease when add the Organic Manure in Soil due to Microbial activity has increased with fertility of Soil increase due to that uptake of plant nutrient which has shown effect on growth yield which has shown in treatment T<sub>9</sub> [@100% (NPK+Zn) +@100% FYM] followed by T<sub>8</sub> [100% (NPK+Zn) +@50% FYM] so, we can recommend farmer to apply NPK, Zinc, and FYM for profitable production of Wheat and good for soil health.

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