

Production potential of wheat (*Triticum aestivum* L.) as influenced by soil conditioners and levels of fertilizer

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ABSTRACT

Field experiment were carried out during Rabi season of 2003-04 and 2004-05 at Research Farm of Shri Durga Ji Post graduate College, Chandeshwar, Azamgarh (UP) to find out the suitable soil conditioners and level of fertilizer on wheat crop. The experiment was laid out in Randomized Block Design with four replications keeping three soil conditioners viz., control, gypsum and FYM and four fertilizer doses viz., 125%RDF, 100%RDF, 75%RDF and 50%RDF. The total treatment combinations were twelve in the present field experimentations. The results revealed that the yield attributes were significantly higher with FYM application @ 5t/ha during both the years, respectively. It enhanced the grain yield to the tune of 4.21 & 2.78 and 4.01 & 2.74q/ha and straw yield 2.93 & 2.16 and 4.52 & 3.71q/ ha over control and gypsum, respectively, in respective years. The margin of 18.7 and 7.7 % in first year and 16.7 and 7.14% in second year in grain yield and in straw yield of 12.95 and 5.74% in first year and 11.4 and 5.24% in second year over 50% and 75%RDF applied, respectively. Applications of 125% RDF were statistically at par to 100% RDF and significantly higher over 75% and 50% RDF. The margin in yield of 7.66%, 7.14%, 18.7%, 16.7% and straw yield 5.74%, 5.24%, 12.95% and 11.14% over 75% and 50% of the recommended doses of fertilizer in both year, respectively. Therefore, the soil conditioners of FYM with application of 125% RDF were better production potential of wheat in present field experimentation.

Keyword: Gypsum, FYM, fertilizer doses, Wheat crop

INTRODUCTION

In India is wheat the main cereal crop. Considered as king of cereal in the world and is grown on the largest area. Based on the rate of population growth of 1.5% and per capita consumption of 180 g of wheat per day, in India the demand of wheat is expected to be around 109 million tons by 2020. In India wheat production in the 2021-2022 crop season ending June is officially projected to be around 106.41 million tonnes. The amount is 3.8 million tonnes less than last year's output and 4.41 percent lower than the previous estimate of 111.32 million tonnes as heat waves in crop growing stage **Anonymous (2022)**. The major challenges for next two to three decades of 21st Century are going to be food and nutritional security for all and especially for families living below poverty line. Worldwide, there is a growing interest in the role of soil conditioner with different levels of fertilizers. Among the various factors responsible for increasing the productivity of wheat, nutrients management is one of the most important for improving the productivity of wheat and maintaining the soil health and physical properties. Supply of the plant nutrient through organic manures like FYM, crop residue, gypsum and green manuring are essential. Therefore the present experiment was undertaken to evaluate the effect of soil conditioners and different level of fertilizers on yield potential of wheat.

MATERIALS AND METHODS

The study was undertaken during 2003 and 2004 as at Research Farm of S.D.J.P.G College, Chandeshwar, Azamgar (UP). The Research Farm geographically located latitude 26.4° N and longitude of 83.11°E. The soil of experimental plots was loamy (sand-52.30%, silt- 24.15% and clay 18.20%) in texture. Availability of nutrients are organic carbon 0.41%, N-226.10%, P₂O₅- 13.21%, and K₂O-131.10% and soil pH was 8.5. Twelve treatment combinations viz- soil conditioners- Control, Gypsum@100 kg/ha and FYM @ 5t/ha and fertilizer levels 125% (N₁₅₀, P₇₅ K₅₀), 100% (N₁₂₀ P₂₀ K₄₀) 75% (N₉₀ P₄₅ K₃₀) and 50% (N₆₀ P₃₀ K₂₀) replicated 4 times in factorial experiment in randomized block design (RBD). Plot size 5m x 3m. Field preparation was done after harvesting of previous crop ploughing with tractor drawn disc harrow and after pre irrigation to ploughing were done and followed by planking. As per treatment gypsum 100 kg/ha and FYM 5t/ha applied before last ploughing and incorporated in soil. Half amount of nitrogen and full amount of P₂O₅ and K₂O as basal with source of Urea, DAP and MOP and application of remaining half dose of nitrogen was top dressed after first irrigation at optimum moisture condition in crop. Sowing of wheat (Malviya 206) was done November 16, 2003 and November 17, 2004 and using 100 kg seed/ha at row spacing maintain as per recommendation other management practices were adopted as per scientific recommendation of the crop grown.

RESULTS AND DISCUSSION

Soil conditioners

The results showed that the application of FYM produced significantly higher ear length, number of spikelets/spike, ear weight, grain weight/spike followed by gypsum over

control. It enhance ear length 0.35 cm, 8.38 cm, 0.73 cm and 0.75 cm. Number of spike lets/spike 45, 42, 130, 122 over gypsum and control treatments respectively during cropping years. Similarly ear weight, grain weight/spike and biological yield were significantly higher over control and gypsum plots except biological yield during 2004. The grain and straw yield was significantly higher with than gypsum and control. It enhanced the grain yield to the tune of 2.78, 4.21, 2.74 and 4.01 q/ha and straw yield 2.16, 2.93, 3.71 and 4.52 q/ha. The higher yield with FYM and gypsum was associated with yield attributes. FYM was improved physical properties of the soil as well as increased availabilities of plant nutrients, which enhanced the yield attributes as well as yield of wheat. Probable reasons for such findings might be due to the effect of different sources of nutrients, which increased biological and grain yield of wheat. The results of in agreement with the finding given by Sushila and Giri (2000), Kumar *et al.* (2001), Verma and Prasad (2003), Singh *et al.* (2006) and Verma *at al.* (2019 I).

Doses of fertilizers

The results from in data, clearly indicate that ear length, number of spike lets/spike, ear weight, grain weight/spike and biological yield were higher in 125% RDF followed by 100% RDS and reduced significantly with reducing the levels of fertilizers. Application of 125% RDF statistically at par to 100% RDF and significantly higher over 75% and 50% RDF. The margin in yield of 3.48q (7.66%), 3.32q (7.14%), 7.71q(18.7%), 7.13q(16.7%) and straw yield 3.37q (5.74%), 3.16q (5.24%), 7.12 q (12.95%) and 6.336 q(11.14%) over 75% and 50% of the recommended doses of fertilizer in respective year, respectively. The higher grain and straw yield of wheat supported by the yield attributes. The higher yield with 125% RDF and 100% RDF were might to be due to availability of sufficient nutrients. Lower RDF reduced the yield due to lack of insufficient availability of nutrients for better yield. It is well known that the presence of essential plant nutrients would increase photosynthesis and favourable condition on provided by the integrated application of soil conditions sources with synthesis fertilizers nutrients. The results are in agreements with the finding given by Kumar *at al.* (2001), Singh *et al.* (2006) and Verma *et al.* (2019 II).

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Table: Yield potential of wheat under soil conditioners and levels of fertilizers doses.

Treatments	Ear length (cm)		No. of spike lets/ spike		Ear weight (g)		Grain weight/spike (g)		Biological yield (q/ha)		Grain yield (q/ha)		Straw yield (q/ha)	
	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05
Soil conditioners														
Control	6.87	6.94	17.22	17.26	2.04	2.05	1.72	1.71	102.01	103.83	44.16	44.75	57.85	57.83
Gypsum	7.25	7.31	18.07	18.06	2.40	2.40	1.82	1.80	104.33	107.71	45.59	46.00	56.62	58.66
FYM	7.60	7.69	18.52	18.48	2.57	2.69	1.89	1.90	109.16	111.37	48.37	48.76	60.78	62.35
S.E.(d)±	0.06	0.07	0.14	0.20	0.046	0.057	0.033	0.044	1.82	1.99	0.96	0.99	0.99	1.19
CD 5%	0.12	0.14	0.29	0.40	0.094	0.103	0.067	0.090	3.71	4.05	1.96	2.00	2.01	2.42
Fertilizer doses														
125% RDF	7.58	7.68	18.23	18.35	2.50	2.52	1.92	1.919	111.02	113.26	48.94	49.82	62.08	63.44
100% RDF	7.44	7.52	18.03	18.04	2.41	2.41	1.87	1.873	109.27	110.73	48.52	48.11	60.59	61.62
75% RDF	7.12	7.21	17.87	17.91	2.31	2.33	1.79	1.792	104.17	106.98	45.46	46.50	58.71	60.28
50% RDF	6.83	6.85	17.60	17.53	2.11	2.14	1.66	1.67	96.19	99.77	41.23	42.69	54.96	57.08
S.E.(d)±	0.07	0.08	0.17	0.23	0.063	0.059	0.038	0.036	2.10	2.30	1.11	1.14	1.14	1.37
CD 5%	0.14	0.16	0.34	0.46	0.108	0.119	0.078	0.104	4.28	4.68	2.26	2.32	2.32	2.71