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Studies about the soil conditioners on production of wheat (*Triticum aestivum* L.) under different levels of fertilizer

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Abstract

The investigation was conducted during *Rabi* season of 2003 and 2004 at Research Farm of Shri Durga Ji Post graduate College, Chandeshwar, Azamgarh (UP) with a view to find out the effect of gypsum and FYM under different levels of fertilizer on wheat. Findings reveals that grain yield attributes were significantly higher with FYM application @ 5 t/ha. 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 over control, respectively in respective years. Application of 125% RDF statistically at par to 100% RDF and significantly high 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.

Keywords: Wheat crop, soil conditioners, fertilizer doses

Introduction

Wheat (*Triticum aestivum* L.) is considered as king of cereal in the world and is grown on the largest area. Wheat contains more nutritive value than other cereals specially high content of niacin and thiamine. 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. Wheat area has risen from 12.8 million hectare in 1966-67 to 29.25 million hectare in 2015-16, wheat production in 2015-16 was around 88.94 million tones and the productivity of wheat in India was 3119 kg/ha (Anonymous, 2017) [9]. The major challenges for next two to three decades of 21st Century is going to be food and nutritional security for all and specially 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. Hence the present experiment was under taken with the objectives to access the effect of gypsum and FYM on yield and yield attributes of wheat under different levels of fertilizer.

Materials and Methods

The field experiment was carried out at Research Farm of S.D.J.P.G College, Chandeshwar, Azamgarh (UP) during *Rabi* season of 2003-04 and 2004-05. 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 in corporate 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. Sowing was done with help of *Kudali*. The data collected

to various parameters were subjected to analysis of variance (ANOVA). Analysis of variance was considered to test for significant differences among the treatments (Panse and Sukhatme 1989) [4].

Results and Discussion

Effect of gypsum and FYM

The data vividly showed (Table-1) that application of FYM produced significantly higher ear length, number of spike lets/spike, ear weight, grain weight/spike followed by gypsum over control. It enhanced 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 are in agreement with the finding given by Akbari *et al.* (1999) [1], Sushila and Giri (2000) [6], Kumar *et al.* (2001) [3], Verma and

Prasad (2003) [7], Singh *et al.* (2006) [5] and Verma *et al.* (2019) [11].

Effect of fertilizers

The results from in Table-1, 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 Yadav *et al.* (1998) [8], Azad *et al.* (1998) [2], Akbari *et al.* (1999) [1], Kumar *et al.* (2001) [3], Singh *et al.* (2006) [5] and Verma *et al.* (2019) [11].

Table 1: Yield and yield attributes of wheat under different soil conditioners and different levels of fertilizers

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	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Soil conditioners														
Control	6.87	6.94	17.22	17.26	2.036	2.054	1.715	1.710	102.01	103.83	44.16	44.75	57.85	57.83
Gypsum	7.25	7.31	18.07	18.06	2.400	2.400	1.819	1.800	104.33	107.71	45.59	46.00	56.62	58.66
FYM	7.60	7.69	18.52	18.48	2.568	2.693	1.894	1.903	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	2.500	2.515	1.915	1.919	111.02	113.26	48.94	49.82	62.08	63.44
100% RDF	7.44	7.52	18.03	18.04	2.408	2.410	1.867	1.873	109.27	110.73	48.52	48.11	60.59	61.62
75% RDF	7.12	7.21	17.87	17.91	2.313	2.330	1.787	1.792	104.17	106.98	45.46	46.50	58.71	60.28
50% RDF	6.83	6.85	17.60	17.53	2.113	2.140	1.664	1.670	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

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