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Research Paper

Effect of Organic Manures on Yield and Economics of Late Sown Wheat (*Triticum Aestivum)*

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ABSTRACT

A field experiment was conducted during *rabi* season of 2010-11 on medium black soil of Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The experiment consisted three replication and fourteen treatments. Application of RPP (RDF+FYM @ 7.5 t ha^{-1}) recorded significantly taller plants (68.11 cm), higher dry matter production (204.90 g/m row length) and number of effective tillers (137/ row length) at 90 DAS and greater ear length (9.01 cm), higher number of grains (41/ear), grain weight (1.39/ear) and (90.87 g/m row length), test weight (34.37 g), grain yield (2724 kg/ha), straw yield (4690 kg/ha), protein content (13.27%), net returns (Rs 35104/ha) and B:C (2.62) compared to other treatments. Under organic treatments SM (50%) basal +PM (50%) as top dressing at 30 DAS clearly followed RPP.

Key words: FYM, compost, vermicompost, poultry manure, sheep manure, wheat

1. INTRODUCTION

Wheat (*Triticum aestivum*) is one of the most widely grown crops in the world, and is the second most important source of staple food in India after rice. In order to increase the wheat yield the farmers are extensively using the chemical fertilizer for higher yield. During the era of green revolution the farmers stressed more in use hybrid and high yielding varieties. However it increased the crop production and productivity but supplying the nutrient source from inorganic fertilizer for long term without any addition of organic manures affected the soil health and resulted in the large scale deficiency of micro nutrients in soil which play an important role in enhancing the quality and quantity of the agriculture production.

Further, heavy application of inorganic fertilizer left residues in grain fruits and vegetables and caused human and animal health. The use of inorganic fertilizer alone also reduces the fertilizer use efficiency by crop through creation of problems such as volatilization, leaching and denitrification of nitrogen.

To overcome the problem of nutrient deficiency and helping the nature rather than destroying it. Organic sources of nutrients are the best option maintain the health of soil, plant and animal and provide the equal opportunity for all living existence to live and use from their beneficial activities, like nitrogen fixation, phosphorus solubilization, recycling of animal waste etc. Hence, the present study was undertaken.

2. MATERIALS AND METHODS

The field experiment was carried out during winter season of 2010-11 at Main Agricultural Research Station,

University of Agricultural Sciences, Dharwad. The crop was sown on December 2010 in medium black soil with pH of 7.3 and available nitrogen of 225 kg ha^{-1}, phosphorus of 37.25 kg/ha and potassium of 351 kg ha^{-1}. The experiment consisted of fourteen treatments viz., T_1: FYM(50%) basal+ vermicompost (50%) basal, T_2: FYM (50%) basal+poultry manure (50%) basal, T_3: Compost (50%) basal+ vemicompost (50%) basal, T_4: Compost (50%) basal+PM (50%) basal, T_5: Sheep manure (50%) basal+ vermicompost (50%) basal, T_6: SM (50%) basal+PM (50%) basal, T_7: FYM (50%) basal+ vermicompost (50%) top dressing at 30 DAS, T_8: FYM (50%) basal+ PM (50%) top dressing at 30 DAS, T_9: Compost (50%) basal+ vermicompost (50%) top dressing at 30 DAS, T_{10}: Compost (50%) basal+PM (50%) top dressing at 30 DAS, T_{11}: SM (50%) basal+ vermicompost (50%) top dressing at 30 DAS T_{12}: SM (50%) basal+ PM (50%) top dressing at 30 DAS, T_{13}: RDF (100:75:50 NPK kg /ha) and T_{14}:RPP (RDF+FYM@ 7.5 t/ha) with three replications. All organic manures were applied based on the content of nitrogen present in them by making nutrient equal to the recommended dose of fertilizer (N). Farm yard manure was used in all treatments @ 7.5 t/ha except T_{13}. T_{13} and T_{14} received the entire dose of phosphorous and as basal dose through single super phosphate and muriate of potash. Nitrogen was applied as per the treatments in two equal splits viz., at basal and at 30 days after sowing (DAS) through urea. The crop was irrigated at 10 days interval. All other operations were performed as per recommendation for the crop. The row spacing was 22.5 cm ×10 cm. The data on various growth, yield, quality attributes and nutrient uptake by plant was recorded in different treatments.

3. RESULTS AND DISCUSSION

3.1 Effect on yield

The significantly higher grain (2724 kg ha^{-1}) and straw yield (4690 kg ha^{-1}) were recorded with RPP, followed by treatments receiving poultry manure (50%) top dressing at 30 DAS along with basal combination of sheep manure (50%), compost (50%) and FYM (50%) separately (T-1). The significantly higher grain and straw yield with RPP might be due to the higher nitrogen availability throughout the crop growth, which caused the higher yield, and this result is in conformity with Sharma and Vyas (2001) who reported that application of 10 t ha^{-1} of FYM to wheat yielded 4230 kg ha^{-1}, whereas, the untreated plot recorded the yield of 3737 kg ha^{-1}. Similar result was reported by Negi *et al.* (1988) in wheat. Abundant supply of nutrients through organics and inorganics might have the protoplasmatic constituents and accelerated the process of cell elongation. This in turn might have increased the values of growth and yield contributing attributes which is reflected in grain and straw yield of wheat (Auti *et al*., 1999). Further, significantly higher grain and straw yield obtained from treatments receiving poultry manure (50%) top dressing at 30 DAS, along with basal combination of sheep manure (50%), compost (50%) and FYM (50%) separately might be due the better nutrient availability and rapid release of nutrient from poultry manure. The reason also could be that the micronutrient content of poultry manure has increased the yield. Reddy (1997) reported that poultry manure contains 2.00, 1.97 4.29 per cent nitrogen, phosphorus, potassium and 113.2, 71.0, 1400.6, 310.5 mg per kg of total Zn, Cu, Fe and Mn, respectively. Channabasanagowda *et al.* (2008) reported that application of vermicompost@ 3.8 t ha^{-1} +poultry manure @ 2.45 t ha^{-1} recorded significantly higher seed yield of wheat (3043 kg ha^{-1}) compared to other treatments.

Table 1. Effect of organic manures on yield and economics of wheat

Treatment	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Gross returns (Rs/ha)	Net returns (Rs/ ha)	B:C
T_1-FYM (50%) basal +VC (50%) basal	2115	3522	44069	5069	1.13
T_2- FYM (50%) basal +PM (50%) basal	2322	3889	48383	23273	1.93
T_3- Compost (50%) basal +VC (50%) basal	2126	3586	44314	6164	1.16
T_4- Compost (50%) basal +PM (50%) basal	2358	3853	49078	24818	2.02
T_5- Sheep manure (50%) basal +VC (50%) basal	2176	3572	45305	9793	1.28
T_6- Sheep manure (50%) basal +PM (50%)basal	2372	4010	49441	27819	2.29
T_7- FYM (50%) basal +VC (50%) top dressing at 30 DAS	2019	3323	42046	3046	1.08
T_8- FYM (50%) basal +PM (50%) top dressing at 30 DAS	2511	4320	52374	27264	2.09
T_9- Compost (50%) basal +VC (50%) top dressing at 30 DAS	1955	3194	40700	2550	1.07
T_{10}- Compost (50%) basal +PM (50%) top dressing at 30 DAS	2578	4434	53784	29524	2.22
T_{11}- Sheep manure (50%) basal +VC (50%) top dressing at 30 DAS	2012	3287	41886	6374	1.18
T_{12}- Sheep manure (50%) basal +PM (50%) top dressing at 30 DAS	2610	4491	54453	32831	2.52
T_{13}-RDF	2194	3725	45737	27758	2.54
T_{14}-RPP (RDF+FYM)	2724	4690	56832	35104	2.62
S.Em+	35	66	705	705	0.031
C.D. at 5%	102	192	2054	2054	0.1

3.2 Economics

The statistical analysis showed that gross and net returns of wheat were significantly higher in case of RPP (Rs 56832 and 35103 ha^{-1}) followed by sheep manure (50%) +PM top dressing at 30 DAS (Rs 54453 and 32831 ha^{-1}, respectively) and the gross return (Rs 53783 ha^{-1}) with compost (50%) +PM top dressing at 30 DAS, and compost (50%) +PM top dressing at 30 DAS (Rs 52373 ha^{-1}) was on par with RPP, and they were higher over rest of the treatments (Table-1). This might be due to the variation in rate of organic manures, as well as significant contribution of these organic manures, which increased the grain and straw yield, respectively over all other treatments and recorded higher gross and net returns.

Significantly higher B:C was recorded with RPP (2.62), which was on par with RDF (2.52). This might be due to higher gross returns and lower cost of cultivation. The minimum B:C (1.07) was recorded with compost (50%) basal+VC (50%) top dressing at 30 DAS, and FYM (50%) basal+VC (50%) top dressing at 30 DAS (1.08). This is attributed due to high cost of vermicompost as well as less gross returns (Table-1).

4. CONCLUSIONS

To achieve maximum yield of wheat grain and straw yield during *rabi* season, an integrated nutrient management system involving farm yard manure (7.5 t ha^{-1}) and RDF(100:75:50 N, P_2O_5, K_2O kg ha^{-1}) helps in maximizing the grain and straw yield.

Under organic production system, integrated organic nutrient management practices involving application of sheep manure (50%) + poultry manure (50%) top dressing at 30 DAS also resulted in higher net returns over other organic manure combinations as well as chemical fertilizers alone.

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