



EFFECT OF ORGANIC AND INORGANIC FERTILIZERS ON YIELD OF WHEAT CROP OF *TRITICUM AESTIVUM* L.

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Abstract

A field experiment conducted during *Rabi* season 2017-18 at farm of lovely professional university phagwara, Punjab to study the effect of organic and inorganic fertilizers on yield and quality of wheat (*Triticum aestivum* L.). The experiment was laid out according to randomized block design with three replication. Treatments includes T₀-control, T₁-100% RDF, T₂-100% vermicompost, T₃-100% FYM, T₄-100 Sludge, T₅-25% RDF+25% vermicompost+25% FYM+25% Sewage sludge with wheat variety HD 2967 was grown. Plant height (cm) significantly increased by (21%, 25.30% and 10.8%) with respect to T₀ respectively 30, 60 and 90 DAS leaf length in T₁ significantly increased by (20.9%, 30.05%, 30.91%) with respect to T₀ respectively 30, 60 and 90 DAS. Leaf number/plant significantly increased in T₅ by (20.5%) with respect to T₀. In T₂ leaf number increased by (22.31%) (37.8%) respectively 30, 60 and 90 DAS. Tiller number plant⁻¹ significantly increased in T₁ by (48%) with respect to T₀. In T₂ tillers number increased by (73.11%) and in T₂ increased by (75.45%) respectively 30, 60 and 90 DAS spike length increased in T₁ (40.95%) and T₅. Ear number plant⁻¹ significantly increased in T₁. Test weight of grain are increased in T₁ and T₅. Biological yield of wheat are significantly increased in T₁ and T₅. Grain yield t^{-ha} significantly increased in T₁ and T₅ (5.49 t^{-ha}, 5.10 t^{-ha}) respectively straw significantly increased in T₃ (10.40 t^{-ha}). Harvest index (%) significantly increased in T₁ (17.18%) with respect to T₀ and in T₅ percentage increased by (10.92%). Protein content (gm/100gm of grain) percentage higher in T₁ and T₅ (11.33 and 10.33 gm) respectively.

Key words: Agriculture, Biotic, Crop, DAS, Energy, FYM, Grain, Vermicompost

Introduction

Wheat (*Triticum aestivum* L.) is ordinarily concurred a chief place among the cereals since of the endless real estate committed to its development, its tall nutritive esteem and its affiliation with a few of the most punctual and most critical civilizations of the world. Wheat is a unique gift of nature to the mankind as it can be molded into innumerable products like chapatis, breads, cakes, biscuits, pasta and many hot and ready-to-eat breakfast foods. Wheat grain contains starch (60-68%), protein (6-21%), fat (1.5-2.0%), cellulose (2.0-2.5%), minerals (1.8%) and vitamins. The intuitively focal points of combining inorganic and natural sources of supplements for the most part demonstrated prevalent to utilize of each component independently (Nambiar and Abrol, 1989). Hence, to maintain the soil health, integrated supplement

administration approaches, including natural and mineral sources have to be uniform.

The present investigation was, therefore, undertaken by adopting effect of different organic and inorganic amendments on wheat yield with the following objects;

1. To study the effect of organic and inorganic fertilizers on morphological characters of wheat crop.
2. To study the effect of organic and inorganic fertilizers on the total soluble protein of wheat crop.
3. To study the effect of organic and inorganic fertilizers on yield of wheat crop.

Materials and method

The present investigation entitled "Effect of organic and inorganic fertilizers on yield and quality of wheat" was carried out in the field of Dept. of Agronomy, School

Table 1: Analysis of chemical properties of soil

Sr. No.	Soil test parameters		
	Test parameter	Method	Reference
1	pH	Glass electrode method	Sparks(1996)
2	EC	Conductivity meter method	Sparks(1996)
3	Organic carbon	Wet digestion method	Walkley and Black (1934)
4	Available N	Alkaline potassium permagnate	Subbiah and Asija (1956)
5	Available P	Olsen's method	Olsen <i>et al.</i> (1954)
6	Available K	Flame photometer method	Toth and Prince (1949)

of Agriculture, Lovely Professional University, Phagwara. A detailed account of the materials used and methods adopted during the course of the investigation are presented in this chapter. The experiment consists of six treatments and replicated three times was set out in complete randomized block design with variety HD-2967 of different fertility levels. The treatments are T₀: Control, T₁: 100% RDF, T₂: 100% Vermicompost, T₃: 100% FYM, T₄: 100 % Sludge, T₅: 25% RDF + 25 % Vermicompost +25% FYM+ 25% Sludge. Five plants were randomly selected from each plot and observations were recorded. The following trails were recorded, viz. Plant height (cm), Number of leaf plant⁻¹, Number of tiller plant⁻¹ at 30 DAS of Intervals for 120 days. Soil samples were taken for the analysis to check soil status of pH, N, P, K, EC, organic carbon, labile carbon and microbial biomass carbon (table 1).

Statistical analysis

All the field and biochemical data were statistically analyzed by using analysis of variance (ANOVA) for RCBD (Randomized Complete Block Design). Data was analyzed by using SPSS software with Duncan's multiple range test (DMRT) having a probability p<0.05. The AHC analysis, Coordinate analysis, was performed with the help of xlstat.

Harvesting parameters

Treatments	Spike length(cm)	Grain/spike ⁻¹	Ear/head in 1m ²	Test weight (g)
T ₀	10.90±0.11	49.66±1.45	335.33±3.17	30.87±2.52
T ₁	14.96±0.03	70 ^a ±0.57	422.33±6.88	43.35 ^a ±0.47
T ₂	13.56±0.33	64 ^c ±0.57	403.00±4.04	41.00 ^b ±0.19
T ₃	13.63±0.33	63 ^c ±0.57	413.66±3.33	40.6 ^b ±0.96
T ₄	13.03 ^b ±0.03	60 ^d ±0.57	382.33 ^b ±13.1	38.88 ^b ±0.10
T ₅	14.33 ^a ±0.16	66.33 ^b ±0.88	418.00 ^a ±1.17	41.60 ^b ±0.83

Spike length (cm)

The analyzed data in table 5, revealed that T₁ and T₅

shows better result. In T₁ and T₅ shows significant increased in spike length with respect to T₀ (table 2). Rehman *et al.*, (2008) also found that farmyard manure at 45 t ha⁻¹ produce the maximum spikes m⁻². Aatif *et al.*, (2017) conducted an experiment on effect of FYM and P levels on yield and yield components of wheat and he found that P and FYM significantly affected spike length and highest spike length was (9cm) recorded in plot treated with 120 kg P ha⁻¹.

Grains spike⁻¹

The analyzed data in table 5, declared that the percentage increased in number of grains/spike in T₁ was 40.95% as compared to T₀. The combined application of organic and inorganic soil amendment plot T₅ also showed better result in number of grains/spike. (Table 2) Similar result were conducted by Rehman *et al.* (2008) conducted an experiment on the effect of organic and inorganic fertilizers increase wheat yield components and biomass under rainfed condition and he found that the linear increase in grain spike⁻¹ (54.4) was observed with increase in NPK combination with organic fertilizers.

Ear head⁻¹M⁻²

The percentage increased in ear no/m² in T₁ was found 25.9% with respect control (T₀). in T₅, the Ear head⁻¹ M⁻² was found significantly increased by 25% with respect to T₀. The treatment T₂ and T₃ was non significant with respect to T₀. (Table 2) Channabasanagowda *et al.* (2007) found that the application of vermicompost +poultry manure recorded significantly higher number of ear heads per meter square.

1000 grain weight(gm)

T₁ show best performance in 1000 grain weight(gm) with the max significant value was 43.35gm and lowest significant value in T₀ (30.87gm) .treatment 2 and 5 showed statistically similar result and it means the combination use of organic and inorganic soil amendments and 100% vermicompost may increase the 1000 grain weight as compare to control. The percentage increased in 1000 grain wt in T₁ was (42.35%) as compared to control (Table 4.5, Fig 4.8) Devi *et al.*, 2011 the application of vermicompost and inorganic fertilizers increase the number of leaves, number of spike and 1000 grain weight (g). Aatif *et al.* (2017) conducted an experiment on effect of FYM and P levels on yield and yield components of wheat and he found that P and FYM significantly affected 1000 grain wt. Channabasanagowda *et al.* (2007) found that the application of vermicompost +poultry manure recorded significantly increased the 1000 grain weight.

At harvesting

Treat-ments	Biological yield (t/ha ⁻¹)	Grain yield (t/ha ⁻¹)	Straw yield (kg)	Harvest index (%)	Protein content (100 g seed)
T ₀	13.04 ^b ±0.53	4.43 ^c ±0.08	8.61 ^b ±0.48	30.03 ^{ab} ±0.10	10.80 ^c ±0.25
T ₁	15.62 ^a ±0.20	5.49 ^a ±0.06	10.12 ^a ±0.18	35.19 ^a ±0.47	12.46 ^a ±0.13
T ₂	15.11 ^a ±0.05	4.89 ^c ±0.06	10.21 ^a ±0.09	32.40 ^{bcd} ±0.46	11.13 ^c ±0.26
T ₃	15.19 ^a ±0.04	4.79 ^{bc} ±0.06	10.40 ^a ±0.20	31.54 ^{cd} ±0.32	11.33 ^{cd} ±0.20
T ₄	14.84 ^a ±0.09	4.63 ^d ±0.03	10.21 ^a ±0.12	31.20 ^d ±0.40	10.30 ^d ±0.20
T ₅	15.31 ^a ±0.02	5.10 ^b ±0.05	10.21 ^a ±0.07	33.31 ^{bc} ±0.40	11.90 ^b ±0.23

Biological yield (t ha⁻¹)

The biological yield of treatment T₁ and T₅ was found significantly by (19.78%) as compared to T₀. In treatment T₂, T₃, T₄ there was no significant difference in biological yield (Table 4.6, Fig 4.9). Similar result were conducted by the Singh and Agarwal (2001) noticed the use of recommended dose of Nitrogen, Phosphorus and Zinc increase the biological yield. Rehman *et al.* (2008) conducted an experiment on the effect of organic and inorganic fertilizers increase wheat yield components and biomass under rainfed condition and he found that the biological yield (10000 kg ha⁻¹).

Protein content (g/100^g of seed)

Higher significant value was found in T₁ and lowest significant value in T₀. The uses of 100% recommend dose of fertilizer lead the protein content in wheat crop. The application of 100% recommended dose of fertilizer may increase the protein content in wheat crop as compared to vermicompost, FYM, sewage sludge and its combine application. The application of FYM and sewage sludge showed at statistically similar result (11.33 and 10.30 g). The percentage increase in protein content in T₁ as compared to control. Channabasanagowda *et al.* (2007) found that the application of vermicompost +poultry manure recorded significantly increased the protein content. R. Lasztity *et al.* (1992) concluded that Nitrogen fertilization in all cases increased the yield of grains and the raw protein content in rye, triticale and winter wheat.

Conclusion

- ◆ Number of ear/head are significantly increased with 100% RDF treatment. and shows also positive result in treatment where combination of organic and inorganic fertilizers are used.
- ◆ Test weight of wheat grain significantly increased with treatment 100% RDF. And also significantly increased with treatment of combination of organic and inorganic fertilizers.
- ◆ The application of 100% RDF significantly increased the grain yield of wheat grain and also increased in treatment of organic and inorganic fertilizers combination.
- ◆ The treatment of sewage sludge significantly increased the straw yield and T₀ control also significantly increased the straw yield.
- ◆ The protein content of wheat grain significantly increased with 100% RDF treatment and treatment of combination of organic

and inorganic fertilizer also significantly increased the protein content in wheat grain.

Future Line of work

Based on result obtained from the present investigation, following suggestion are indicated for further studies

- ◆ It is necessary to indentify the suitable chemicals has been used in present investigation for improving the yield attributes of wheat.
- ◆ It is essential to identify the suitable microbes for enhancing yield attributes of wheat.
- ◆ There is need to study the nutritional parameter, non enzymatic parameter and other important non nutritional parameter etc.

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