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Effect of organic and inorganic source of nitrogen on yield of wheat (*Triticum aestivum* L.)

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Abstract
A field experiment was conducted during *Rabi* 2019 at experimental research farm of Chandigarh University, Gharuan (Mohali) to study the Effect of organic and inorganic supply of nitrogen on yield and quality of Wheat (*Triticum aestivum* L.) below irrigated condition. The amount of organic and inorganic sources applied to crop is 2.6 q/ha of urea and 2.4 t/ha of FYM and 8 t/ha of Vermicompost. There were total ten treatments comprising of wheat with treatment details were T1 control (no nitrogen), T2 = 120kg N/ha from urea, T3 = 120kg N/ha from FYM, T4 = 120kg N/ha from vermicompost, T5 = 25% FYM + 75% UREA, T6 = 25% vermicompost + 75% UREA, T7 = 50% FYM + 50% UREA, T8 = 50% vermicompost + 50% UREA, T9 = 25% (FYM + vermicompost) + 75% UREA, T10 = 50% (FYM + vermicompost) + 50% UREA. The experiment was laid down in randomized block design with three replications with organic and inorganic source of nutrient. Growth, yield attributes, grain and straw yields of wheat were more in case of treatment of irrigation scheduling was (20-21 + 50-55 + 75-80 DAS). And among different organic and inorganic nitrogen sources, FYM + Vermicompost + Urea gave the best results Application of different organic and inorganic sources of nutrition significantly influenced the number of tillers per meter square and the data was recorded as same as plant height. Ten to fifteen days difference between organic and inorganic treatments to reach the maturity and earing stage. The highest net returns (₹ 75075) as well as net returns per rupee invested (1.57) were obtained by 25% (FYM + vermicompost) + 75% UREA, whereas lowest net returns (₹ 7611) were obtained by 120kg N from FYM and (0.08) net returns per rupee invested.

Keywords: organic, inorganic, nitrogen, scheduling, grain, growth, yield

Introduction
In India, wheat is cultivated in about 31 million hectare with production and productivity of 107.2 million tones and 3.5 tons per ha, respectively (Anonymous 2020 [2]). In Punjab, the area under wheat cultivation is 3.4 million ha with a production of 14.9 million tones and productivity of 4.3 tons per ha (Anonymous 2019 [1]). The trend during last five years has shown a marginal decline in production and productivity of wheat. The speedy increase within the world population demands parallel will increase in food production, notably of wheat. Although organic amendments will offer accessible nutrients for plants and nutrient transformation throughout organic matter decomposition powerfully interacts with plant nutrient uptake, resulting in a contest for nutrients between soil microorganisms and plants. Further, these systems are helpful for the general health of the Agric-environment. Development and management of effective fertilization practices, resembling by manipulating the amount and kind of organic amendments, improve soil ecosystems and fertility. Fertilizers play a pivotal role in increasing yield and enhancing the pleasant of crops. It ought to be harassed that the value of FYM, vermicompost and inexperienced leaf manure in soil development is due to their nutrient content, besides helping in the improvement of soil shape and water holding capability of for organic crop production, the seeds produced beneath organic device ought to be used. Priority region globally in view of the developing call for safe and healthful meals and long time sustainability and worries on environmental pollution associated with indiscriminate use of though the use of chemical inputs in agriculture is inevitable to meet the developing call for food in world, there are opportunities in selected vegetation and niche regions where natural production may be endorsed to tape the home export market. Biofertilizers are important not only for the reduction in quantity of chemical fertilizers however additionally for getting better yield in sustainable agriculture. Integrated nutrient management (INM) is a better technique for presenting nutrition to the crop by means of including organic and inorganic sources of nutrients The impact of integrated use of organic and inorganic fertilizers on the yield of wheat was evaluated and also the results showed that integrated use in numerous proportions redoubled the plant height, spike length, grain per spike and 1000-grain weight.

Materials and Methods
This experiment was conducted during the 2019-2020 *Rabi* season at University farm, University Institute of Agricultural Sciences, Chandigarh University, Gharuan (Punjab) to study the Effect of organic and inorganic supply of nitrogen on yield and quality of Wheat (*Triticum aestivum*) below irrigated condition. The experiment consisted of 3 blocks of ten plots each and the experiment was laid out in a randomized block design with three replications having a net plot size of 12m x 12m and gross plot size is 500m^2. Row spacing of 20 cm was maintained. Wheat variety PBW-343 was sown at the rate 100 kg ha-^{1} on 14-12-2019. The soil of the experimental site was silty clay loam in texture and acidic in reaction. The annual rainfall of this region is about 301.4mm. The rainfall is unevenly distributed and most of the rainfall is received

during the SW Monsoon which is about 217.2mm of total rainfall.

At the time of research we used organic and inorganic nitrogen sources. Ten treatments are there to complete the research - T1 control (no nitrogen), T2 = 120kg N/ha from Urea, T3 = 120kg N/ha from FYM, T4 = 120kg N/ha from vermicompost, T5 = 25% FYM + 75% Urea, T6 = 25% vermicompost + 75% Urea, T7 = 50% FYM + 50% Urea, T8 = 50% vermicompost + 50% Urea, T9 = 25% (FYM + vermicompost) + 75% Urea, T10 = 50% (FYM + vermicompost) + 50% Urea. Data was analyzed for growth and yield characters like plant height (cm), number of tillers, dry matter accumulation (m^2), grain yield, Straw yield (q/ha), Biological yield (q/ha) and harvest index were recorded.

Results and Discussion

Effect of irrigation scheduling and organic sources of nutrient on growth parameters (plant height, number of tillers, and dry matter accumulation), yield (grain yield, Straw yield, Biological yield and harvest index were recorded).

Plant Height

The highest plant height at maturity (100 cm) was observed in T10 (FYM + Vermicompost + Urea) application at all the growth stages. It was significantly superior to other treatments at all the recorded observations. Minimum plant height of wheat was recorded in treatment T1 (control). Among the organic nutrient sources, maximum plant height (96 cm) was recorded with treatment T4 (vermicompost) in table 1.

Table 1: Effect of organic and inorganic nitrogen sources on plant height, dry matter accumulation, and number of tillers

Treatments	Plant height (cm) at maturity	Dry matter accumulation (g/m2)	Number of tillers (m^2)
T1	90.83	548.00	146
T2	93.93	523.33	162
T3	94.67	697.67	167
T4	93.77	614.33	165
T5	94.10	573.00	150
T6	93.70	633.00	160
T7	95.53	793.67	164
T8	96.37	632.33	161
T9	97.37	894.67	160
T10	99.74	980.33	156
CD (P=0.05)	NS	14.10	3.12

Dry matter accumulation

The results revealed that the highest dry matter at maturity accumulation was recorded in T10 (FYM + Vermicompost + Urea) from 30 DAS (54 g/m2) till Maturity (980 g/m2), which was significantly superior to all the treatments. Among the organic sources of nitrogen T4 (Vermicompost) recorded highest dry matter accumulation (714 g/m2), which was significantly superior to all the organic treatments and control.

These results corroborate the findings of (Nehra *et al*. 2001 [10]).

Number of tillers

Number of tillers of wheat increased progressively with the advancement of crop age up to maturity, the maximum increase being recorded on maturity. The maximum numbers of tillers (294) were recorded in T10. Among organic nitrogen sources, T4 (Vermicompost) produced maximum numbers of tillers (286) at all crop growth stages, which is significantly higher than T1, T3, T2, and T7. Lowest number of tillers (191) was observed under T1 (control). These results corroborate the findings Aslam (2013 [3]).

Table 2: Effect of organic and inorganic source of nitrogen on grain yield, straw yield, biological yield and harvest index.

Treatments	Grain yield Kg/ha	Straw yield Kg/ha	Biological yield	Harvest index
T1	2287	3439	5727	5727
T2	4351	4473	8990	8990
T3	4547	4614	9019	9019
T4	4337	4663	8599	8599
T5	3169	4072	8341	8341
T6	4352	4574	8926	8926
T7	4659	4837	9396	9396
T8	4302	4374	7276	7276
T9	4910	5140	9658	9658
T10	5118	5384	9983	9983
CD (P=0.05)	184.73	216.60	255.30	1.79

Table 3

Control (no nitrogen) T_1	100% N/ha from urea T_2	100% N/ha from Urea T_3	100% N/ha from VC T_4	25% FYM + 75% Urea T_5	25% VC + 75% Urea T_6	50% FYM + 50% Urea T_7	50% Vermicompost + 50% Urea T_8	25%(FYM + VC) + 75% Urea T_9	50%(FYM + VC) + 50% Urea T10

Grain yield

Final seed yield per unit area of wheat is a cumulative effect of yield components like number of grains/spike; 1000-seed weight etc. The highest grain yield was recorded under T10 (FYM + Vermicompost + urea) followed by conventional with the amount of grain yield (4.9 t/ha) and lower amount of grain yield observed under T1 (Control) with the amount of grain yield (2.29 t/ha) in figure 4.3.1. Among organic

nitrogen sources T4 (Vermicompost) recorded the highest grain yield (4.34 t/ha), which was statistically at par with T1 (2.29 t/ha), T3 (4.08t/ha), T5 (4.07t/ha), T7 (2.86t/ha), T8 (2.90t/ha) in table 2.

Straw yield

The highest straw yield of wheat (5.19 t/ha) was recorded under T10 treatment (FYM + Vermicompost + Urea) and the lower straw yield was recorded (3.44 t/ha) with the T1 treatment (Control). Among organic nitrogen sources T4 (FYM) recorded the highest straw yield (4.41t/ha). Similar result was also found by Kumar *et al*. (2017 [8]) in table 2.

Biological yield

The highest biological yield of wheat (9.88 t/ha) was recorded under T10 treatment (FYM + Vermicompost + Urea) and the lower biological yield was recorded (5.73 t/ha) with the T1 treatment (Control). Among organic nitrogen sources T4 (Vermicompost) recorded the highest biological yield (8.40t/ha), which was statistically at par with T1, T3 and some other treatments in table 2.

Harvest index

The physiological efficiency and ability of a crop plant for converting the total biomass into seed yield is known by its Harvest Index. The higher the value of harvest index more will be the seed yield per unit of dry matter. It is evident from the data in variety PBW-343. The highest harvest index was recorded under T10 (FYM + Vermicompost + Urea) treatment followed by conventional with the amount of harvest index (53.91%) lower amount of harvest index observed under T1 (Control) treatment. Similar result was conducted by Iqtidar *et al.* (2006 [6]) and Badaruddin *et al.* (1999 [4]) in table 2.

Conclusion

It was concluded that the treatment (T10) has given best results. Among the organic nitrogen source vermicompost has given the higher yield comparison than FYM. The highest net returns (₹ 75075) as well as net returns per rupee invested (1.57) were obtained by 25% (FYM + vermicompost) + 75% UREA. The best treatment was found by combination of organic and inorganic treatment and only organic treatment is showing almost similar result.

References

1. Anonymous. Periodical publication. Punjab Agricultural University, 2019, 56-58.
2. Anonymous. Commodity intelligence report, United States Department of Agriculture (USDA), 2020.
3. Aslam Muhammad. Effect of organic manures on the yield components and yield of wheat (*Triticum aestivum* L.) under arid condition. M. Sc. (Hons.) Thesis, Gomal University, Dera Ismail Khan, Pakistan, 2013.
4. Badruddin M, Reynolds, Ageeb. Wheat management in warm environments: Effect of organic and inorganic fertilizers, irrigation frequency and mulching. Agronpmy Journal,1999:91:975-983.
5. Choudhary AK, Suri VK. Effect of organic manures and inorganic fertilizers on productivity, nutrient uptake and soil fertility in rice (*Oryza sativa*)-wheat (*Triticum aestivum*) crop sequence in western Himalayas. Current Advances in Agricultural Sciences,2019:1(2):65-69.
6. Iqtidar H, Ayyaz, Ahmad. Bread wheat varieties as influenced by different nitrogen levels. Journal Zhejiang Universe Science,2006:7:70-78.
7. Jain MP. Response of durum wheat to sowing dates and N levels in vertisol of central India. Gujarat Agricultural University Research Journal,1999:25(1):5-8.
8. Kumar V, Raghuvanshi N. Effect of different combination of FYM and Urea on growth and yield of wheat. Buletien. Enviornmental Pharmacol. Life Science,2017:6(2):395-398.
9. Manqiang *et al*. Agronomic and economic efficiency of manure and urea fertilizers use on Vertisols in Ethiopian highlands. Agricultural Sciences in China,2009:8:352-360
10. Nehra AS, Hooda IS, Singh KP. Effect of integrated nutrient management on growth and yield of wheat (*Triticum aestivum* L.). Indian Journal of Agronomy,2001:46(1):112-117.
11. Shah JA, Depar N, Memon MY, Aslam M, Sial NA. Integration of organic and mineral nutrient sources enhances wheat production. Pakistan Journal of Agriculture Agricultural Engineering and Veterinary Sciences,2013:29(2):106-113.
12. Tehulie, Tola. The Effect of Organic and Inorganic Fertilizers on Growth and Yield of Bread Wheat (Triticum aestivum L.) Current Investigation Agriculture Current Research,2020:9(1):1161-1165.
13. Vikash Kumar, Nikhil Raghuvanshi *et al*. Effect of different combination of FYM and Urea on growth and yield of wheat,2017:6:395-398.