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An evaluation of Wheat based Cropping System with Nutrient Management of *kharif* Crop Soybean

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A B S T R A C T

The study was conducted at research field of Krishi Vigyan Kendra, Ganiwan, Chitrakoot (U.P.) on Ph. D. work topic of "Diversification of wheat (*Triticum aestivum L.*) based cropping system with nutrient management in Central Plateau of Uttar Pradesh" during the year 2014-15 and 2015-16, to study the effect of soil test based crop response technology on yield and economics of wheat. The yield of wheat 2357.67kg/ha achieved with application of N: P: K as 200% and yield of 4283.84 kg/ha is achieved with application of N: P: K as 175 % along with 2 tone Vermi - compost. On the basis of soil test value condition of wheat cultivation B: C ratio is 1.81. Hence combination of vermi – compost and inorganic fertilizer could achieve maximum yield and maintain the soil fertility status.

Introduction

Wheat (*Triticum aestivum L*) is one of the most important food grain crops in the world. In our country it is placed just after paddy in terms of production and consumption. It is consumed mostly in the form of "*Chapatti*". Wheat straw is used for feeding the cattle. Wheat grain contains more than 11 percent protein than other cereals and has a relatively high content of niacin and thiamine. It is basically concerned in providing the characteristics substance "gluten" which is very essential for bakers.

Wheat is most important winter crop grown in India during Rabi season from November to April. The overall production of wheat in India has gone tremendously from 12.8 million tons in 1966 to a record height 86.87 million tons. The productivity has increased from 887 to 2900 kg/ha. For the production point of view India is the second wheat growing country after China in the world.

Wheat is cultivated in almost every state except Kerala. Based on the agro-climatic conditions and varying agro ecological

production conditions, the country is broadly divided into six wheat growing zones. The maximum wheat growing duration is in Northern Hill Zone and minimum in Peninsular Zone.

The latest development in Mexican wheat and advanced production technology has made it possible to harvest more than 5 tons/ha of wheat grains. But the availability of per capita wheat which has increased by 300 percent over the past 30 years show that by 2020 AD the present level of 185 gram per capita per day will rise to 220 gram and the 1.3 billion feeding mouth that time in the country will require 105 million tons of wheat.

Uttar Pradesh is the premier wheat production state, which shares were than 36 percent both in the area and production in the country. The state occupies an area of 8.99 million hectares and has record production of 24.33 million tons with productivity of 26.59 q/ha.

Materials and Methods

The material and techniques adopted the course of investigation two consecutive years (kharif, Rabi 2014-2015 and 2015-2016) along with a description of edaphic and climatic conditions under which the trial was conducted.

Experimental site

The experiments were lay out at Tulsi Krishi Vigyan Kendra, Ganiwan, Chitrakoot, U.P. on clay loam soil along with a description of edaphic and climatic conditions under which the experiment was conducted.

Climate

Geographically, Chitrakoot falls in central plateau of Uttar Pradesh and is situated at $80^0$58’ to $81^0$34’ east longitude and $24^0$48’ to north latitude. It is situated at an elevation of 125.90 m above mean sea level. The mean annual rainfall of the district is 802 mm.

Details of experimental design and lay out

A four replicated Randomized Block Design was adopted during both the years of experimentation for according the treatments.

Experimental treatments

Symbols: In this investigation the treatments with symbols are given in Table 1.

Results and Discussion

Grain yield (G) per plant and grain yield Kg per hectare

The data regarding on grain yield per plant (g) and 1000, grain yield kg per hectare of soybean were tabulated and analyzed statistically and the results have been presented in Table 2, the mean value of various treatment also depicted by graphically in Figure 1.

It is obvious from the result Table 2 showed that the various treatments significantly influence the grain yield (g) per plant and with the application of T4 treatment bigger significantly over rest treatments of soybean in both the year.

It is noticeable from the result Table 2 showed that the various treatment significantly influence the grain yield (kg/ha) of soybean and with the application of T4 treatment increased significantly over rest treatment in both the year.

Straw yield and biomass yield Kg/ha

The data regarding on straw yield (kg/ha) and biomass yield (kg/ha) of soybean were

tabulated and analyzed statistically and the results have been presented in Table 3, the mean value of various treatment also depicted by graphically in Figure 2.

It is obvious from the result Table 3 showed that the various treatments significantly influence the straw yield (kg/ha) and with the application of T4 treatment bigger significantly over rest treatments of soybean in both the year.

It is noticeable from the result Table 3 showed that the various treatment significantly influence the biomass yield (kg/ha) of soybean and with the application of T4 treatment increased significantly over rest treatment in both the year.

Table.1 Treatments symbols for kharif and rabi crops

Symbols	Kharif	Rabi	Total NPK (%)
	Treatments		
T1	100% NPK	100% NPK	200%
T2	100% NPK S Zn	75% NPK	175%
T3	100%NPK S Zn	50% NPK	150%
T4	75%NPK + Vermi-compost @2t/ha	100%NPK	175+Vermi-compost
T5	75%NPK +Vermi -compost @ 2t/ha	75%NPK	150+ Vermi-compost
T6	75%NPK+Vermi-compost @ 2t/ha	50%NPK	125+ Vermi-compost
T7	50%NPK+vermi-compost @ 2t/ha	100%NPK	150+ Vermi-compost

Note: T1, T2 and T3 are graded doses (200 to 150%) and
T4, T5 and T6 are also graded doses involving vermi compost (175 to 125%)
T1, T4 and T7 could be recommended if trial conducted nicely and control Treatments.

Table.2 Effect of various nutrients on grain yield (g) per plant at maturity and grain yield kg/ha of soybean in 2014-15 and 2015-16

Treatments	Grain yield (g)/ Plant in 2014-15	Grain yield (g)/ plant in 2015-16	Grain yield kg/ha in 2014-15	Grain yield kg/ha in 2015-16
T1	6.05	6.23	2014.48	2073.23
T2	7.91	8.11	2633.75	2701.31
T3	8.10	8.29	2696.34	2753.58
T4	9.88	10.23	3294.68	3399.57
T5	9.10	9.24	3024.93	3073.22
T6	9.16	9.13	3040.67	3042.83
T7	8.17	8.30	2718.42	2766.03
SE (d)	0.19	0.44	86.23	138.19
CD (P=0.05)	0.41	0.91	181.23	290.42

Fig.1

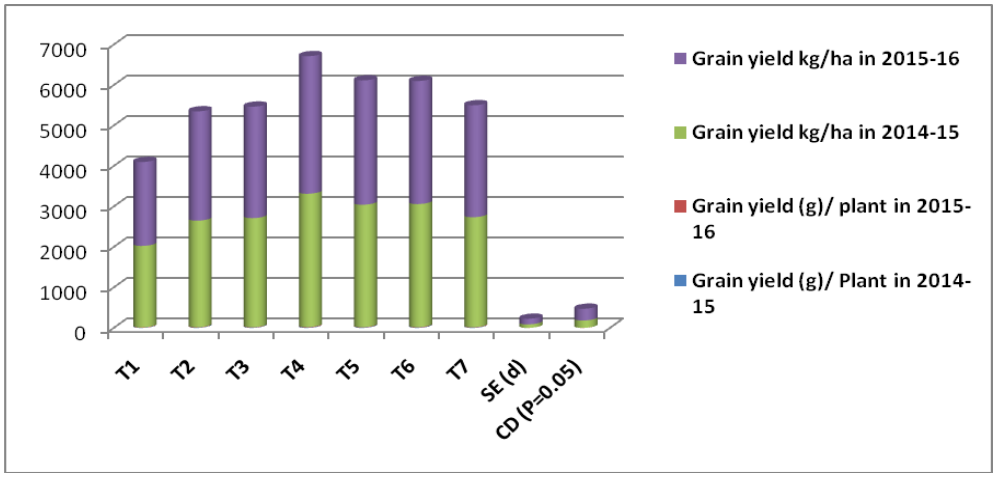

Fig.2

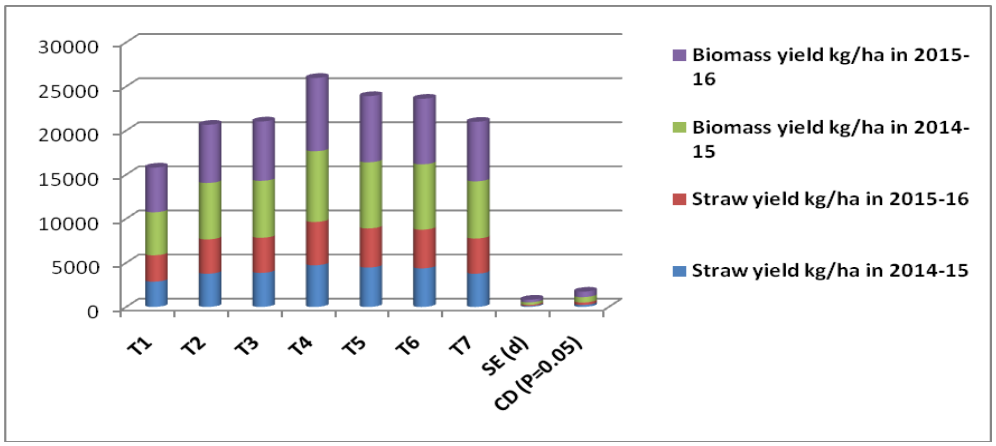

Fig 3

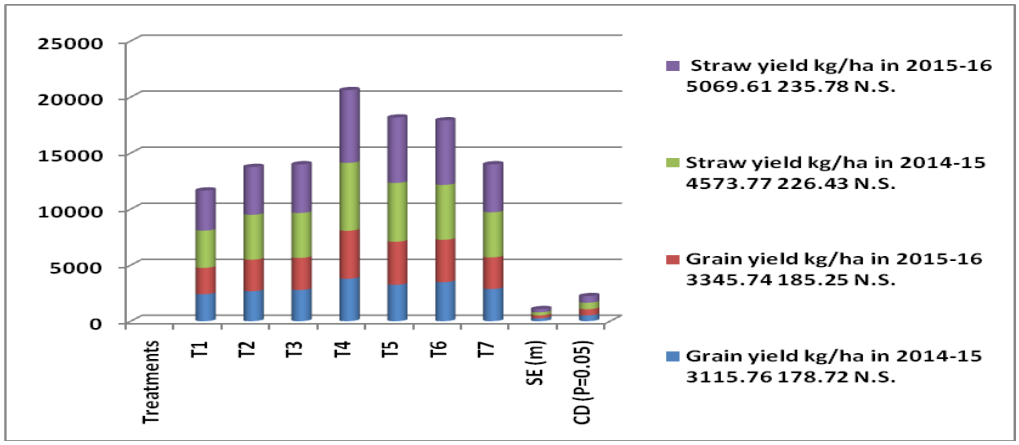

Table.3 Effect of various nutrients on straw yield and biomass yield (kg/ha) at maturity of soybean in 2014-15 and 2015-16

Treatments	Straw yield kg/ha in 2014-15	Straw yield kg/ha in 2015-16	Biomass yield kg/ha in 2014-15	Biomass yield kg/ha in 2015-16
T1	2866.74	2990.75	4881.22	5063.98
T2	3764.32	3897.40	6398.07	6598.71
T3	3864.63	3977.68	6460.65	6731.26
T4	4725.47	4912.08	8020.15	8311.65
T5	4470.05	4436.05	7494.98	7509.27
T6	4373.25	4390.10	7413.85	7432.93
T7	3768.08	3988.28	6486.50	6754.31
SE (d)	108.66	132.37	288.95	295.45
CD (P=0.05)	228.37	278.149	607.08	620.74

Table.4 Effect of crop soybean and various nutrients on grain yield kg/ha and straw yield kg/ha at maturity of wheat in 2014-15 and 2015-16

Crop	Grain yield kg/ha in 2014-15	Grain yield kg/ha in 2015-16	Straw yield kg/ha in 2014-15	Straw yield kg/ha in 2015-16
Soybean	3115.76	3345.74	4573.77	5069.61
SE (d)	178.72	185.25	226.43	235.78
CD (P=0.05)	N.S.	N.S.	N.S.	N.S.
Treatments				
T1	2403.44	2357.67	3322.39	3572.66
T2	2674.77	2816.55	4000.42	4268.11
T3	2782.85	2866.35	4006.67	4337.41
T4	3783.23	4283.84	6058.08	6490.08
T5	3242.85	3846.02	5252.40	5830.33
T6	3478.96	3787.19	4895.27	5754.72
T7	2872.30	2823.23	4020.51	4276.70
SE (m)	258.68	262.45	274.45	278.95
CD (P=0.05)	518.73	551.41	576.62	586.07

Grain and Straw Yield Kg/Ha Of Wheat Crop

The regarding to number of grain yield kg/ha and straw yield kg/ha of wheat at maturity tabulated and analyzed statistically, the results have been presented in result Table 4, the mean values also depicted by graphically in figure 3.

Grain yield kg/ha

Effect of cropping system

It is obvious from the result Table 4 showed that the different crops failed to touch the level of significant in connection of grain yield kg/ha of wheat, but after soybean the grain

yield kg/ha statistically higher in both the years.

Effect of nutrients

It is evident from the result Table 4 showed that the various nutrient significantly ability the grain yield kg/ha at maturity of wheat crop and with the application T4 (100% NPK +vermi-compost (Total NPK 175%) found significantly enhanced and T1 200 % NPK found significantly lowest in both the year.

Straw yield kg/ha

Effect of cropping system

It is prominent from the result Table 4 showed that the different crops failed to touch the level of significant in connection of straw yield kg/ha of wheat, but after Soybean the straw yield kg/ha statistically higher in both the years.

Effect of nutrients

It is able to be seen from the result Table 4 showed that the various nutrient significantly influence the straw yield kg/ha at maturity of wheat crop and with the application T4 (100% NPK + vermi - compost (Total NPK 175%) found significantly superior and T1 200 % NPK found significantly lowest in both the year.

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