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Effect of organic nutrient sources on plant nitrogen, phosphorus and potassium content at different stages of wheat crop

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Abstract
The investigation entitled Effect of Organic Nutrient Sources on Soil Health and Productivity of Wheat under Rice-Wheat System was carried out at the Crop Research Centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, (U.P) during *Rabi* seasons of 2017-18. The experiment consisting seven treatments *viz*. T_1- Control, T_2- 10 t ha^{-1} FYM, T_3-10 t ha^{-1} FYM +Cow urine + *Azotobacter*, T_4- 10 t ha^{-1} Vermicompost, T_5- 10 t ha^{-1} Vermicompost+ Cow urine + *Azotobacter*, T_6- 7.5 t ha^{-1} FYM+ Cow urine + *Azotobacter*, T_7- 80% of RDF of nitrogen through vermicompost + 10% through neem cake + *Azotobacter* was laid out in randomized block design with three replication. Result show that T_7 (80% of RDF of nitrogen through vermicompost + 10% through neem cake + *Azotobacter*) significantly higher plant Nitrogen, Phosphorus and Potassium content at tillering, jointing and at harvesting stage (grains and straw) over the control plot.

Keywords: Vermicompost, *Azotobacter* phosphorus and wheat

Introduction
Wheat is one of the cereal crops which have its own importance due to high nutritional value and premier food grain crops of the country. In India, during green revolution period, intensive agriculture involving exhaustive high-yielding varieties of wheat and it has led to heavy withdrawal of nutrients from the soil. Nutrient management has played very significant role in providing the physical condition of soil and supply all the nutrients which are required by crop for balanced nutrition. Organic nutrient sources developed as an effective way to decrease environmental damage and increase awareness of food quality from using number of organic nutrient sources and ensure long term food security. Organic nutrients source combine scientific knowledge of ecology and technology with traditional farming practices based on naturally occurring biological processes. Instead of using synthetic pesticides and water soluble synthetically purified fertilizers, organic farmers are restricted by regulations to natural pesticides and fertilizers

Materials and Methods
A field experiment was conducted during *rabi* season 2017-18 at chirodi farm of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.) The area situated at a latitude of 29o 40′ North and longitude of 77o 42′ East with an elevation of 237 m above mean sea level. The soil of the experimental field was well drained, alkaline in reaction (pH 7.25), low organic carbon, sandy loam in texture, low in available nitrogen, medium in available phosphorus and potassium with an electrical conductivity 0.29 dSm^{-1}. The experiment consisting seven treatments *viz*. T_1- Control, T_2- 10 t ha^{-1} FYM, T_3-10 t ha^{-1} FYM +Cow urine + *Azotobacter*, T_4- 10 t ha^{-1} Vermicompost, T_5- 10 t ha^{-1} Vermicompost+ Cow urine + *Azotobacter*, T_6- 7.5 t ha^{-1} FYM+ Cow urine + *Azotobacter*, T_7- 80% of RDF of nitrogen through vermicompost + 10% through neem cake + *Azotobacter* was laid out in randomized block design with three replication. The required quantities of NPK (120:60:40) were applied in the different treatments by FYM, vermicompost, cow urine, neem seed cake.

Observations recorded

Plant analysis

Nitrogen content

Plant nitrogen content at tillering, jointing and at harvest stages in grain and straw of wheat will be determined by Kjeldahl Method. 0.5 g finely ground, dried 0.5 mm sieved plant sample wrap in a tissue paper was drop into digestion tube. To this 20 g of the digestion accelerator mixture (20 parts anhydrous Na2SO4, selenium with one part of CuSO4.5H2O) and 35 ml Conc. H2SO4 was added. Tube was placed in a digestion block and digestion was performed until yellow or dark colour totally disappear. After cooling tubes were removed from the block distillation was performed with 40% NaOH in auto N- analyser and liberated ammonia was trapped in 25 ml of 4% H3BO3 containing mixed indicator. A blank sample (without plant sample) was also run identically. Distillation was titrated with 0.02N H2SO4 until a purple color just appear.

Phosphorus content

Plant phosphorus content at tillering, jointing and at harvest stages in grain and straw of wheat will be determined by yellow colour method using vanadomolybdate reagent, 1g plant sample was digested with diacid mixture (HNO3: HClO4) and digested material was diluted to 100 ml. 5ml of digested aliquot was taken for the colour development (Jackson, 1973) [2].

Potassium content

Plant potassium content at tillering, jointing and at harvest stages in grain and straw of wheat will be determined by Flame photometric method (Bhargava and Raghupathi, 1993).

Statistical analysis

The experiment was laid out in Randomized Block Design (RBD). Standard error of Mean in each case and critical difference only for significant cases were calculated at 5% levels of probability as under.

$$\text{Standard error of mean} = \frac{\sqrt{\text{EMSS}}}{\text{R}}$$

Where,
SEm± = Standard error of mean
EMSS = Error mean sum of square
R = Number of replication on which the observation is based.

The data obtained would be subjected to statistical analysis as outlined by Gomez and Gomez (1984) [1]. The treatment means will be compared using transformed means. The level of significance used in "F" test was given at 5 per cent. Critical difference values are given in the table at 5 percent level of significance, wherever the "F" test was significant at 5 per cent level.

$$CD = \frac{\sqrt{2 \text{ X Error mean square}}}{\text{r}} \text{ X t } 0.05$$

Where, CD = Critical difference
r = Number of replications of the factor for which C.D. is to be calculated.
$t_{0.05}$ = Value of percentage point of 't' distribution for error degree of freedom at 5 per cent level of significance

Table: Effect of organic nutrient sources on plant Nitrogen, Phosphorus and Potassium content at different stages of wheat crop

Treatments	Nitrogen content (%)				Phosphorus content (%)				Potassium content (%)			
	Tillering	Jointing	At harvest		Tillering	Jointing	At harvest		Tillering	Jointing	At harvest	
			Grain	Straw			Grain	Straw			Grain	Straw
T_1 (Control)	0.95	0.87	1.51	0.29	0.32	0.21	0.22	0.10	1.25	1.12	0.31	1.25
T_2 (10 t ha^{-1} FYM)	1.30	1.16	1.59	0.33	0.37	0.31	0.23	0.14	1.52	1.49	0.34	1.29
T_3 (10 t ha^{-1} FYM + Cow urine + *Azotobacter*)	1.39	1.30	1.65	0.35	0.47	0.34	0.30	0.17	1.58	1.49	0.38	1.46
T_4 (10 t ha^{-1} Vermicompost)	1.31	1.28	1.61	0.33	0.46	0.33	0.27	0.16	1.55	1.51	0.32	1.33
T_5 (10 t ha^{-1} Vermicompost + Cow urine + *Azotobacter*)	1.40	1.33	1.69	0.38	0.48	0.35	0.33	0.18	1.61	1.50	0.42	1.45
T_6 (7.5 t ha^{-1} FYM + Cow urine + *Azotobacter*)	1.38	1.32	1.62	0.34	0.46	0.33	0.29	0.17	1.57	1.43	0.40	1.37
T_7 (80 % of RDF of nitrogen through vermicompost + 10 % through neem cake + *Azotobacter*)	1.43	1.36	1.74	0.41	0.49	0.38	0.32	0.21	1.66	1.52	0.43	1.48
SEm±	0.04	0.04	0.06	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.01	0.04
CD (P=0.05)	0.13	0.12	0.17	0.03	0.04	0.03	0.04	0.02	0.15	0.14	0.03	0.13

Results and Discussion

Higher nitrogen content at maximum tillering, jointing and at harvesting stage (grains and straw) recorded under T_7 treatment which significantly higher to all the rest treatments. The higher N content in this treatment might be due to better utilization of nitrogen from soil with well-developed root system owing to steady N supply throughout the crop growth stages, which might have resulted in adequate availability of nitrogen causing higher N content in plant at all the stages of crop growth. These results are in line with the finding of Sharma *et al.* (2013) [5]. similar opinions were also forwarded by Kizilkaya *et al.* (2012) [4].

Plant P content also differs significantly at different stage under the influence of different treatments. Basal application of higher organic manure resulted in comparatively higher plant P content at tillering stage. Which may be ascribed due to better root growth in these treatments responsible for more P absorption from soil which was decline at jointing stage under different treatments, which may be due to dilution effect. Grains P content also differ significantly treatments having higher P content at tillering showed higher grain P content. This may also ascribe due to mobility of phosphorus from older part to new part. under different nutrient managements treatments, significantly highest potassium content recorded in T7, which statistically *at par* T2, T4, T5,

T6 and T3 but significantly higher to all the rest treatments. Since, all the treatments received similar dose of potassium but still significantly higher K content in T7 than some treatment could not be fustily at present. Minimum potassium content at all the stages was recorded in T1 (control). This is consonance with the findings of Kumar *et al*. (2015) [3].

Conclusion

conclude T_7 (80% of RDF of nitrogen through vermicompost + 10% through neem cake + *Azotobacter*) significantly higher plant Nitrogen, Phosphorus and Potassium content at tillering, jointing and harvesting stage (grains and straw) over the control plot.

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