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Effect of integrated nutrient management on nitogen content, uptake and quality of wheat (*Triticum aestivum* L.) under partially reclaimed sodic soil

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Abstract
Integrated use of farm yard manure, vermi-compost and chemical fertilizers was carried out to evaluate nitrogen content, uptake and qualityof NW-1014 under Sodic soil during rabi seasons at Instructional Farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) India. The experiment was consisting of eight (8) treatment viz., T1 (control), T2 (100% RDF), T3 (75% RDF + 25% FYM-N), T4 (50% RDF +50% FYM- N), T5 (25% RDF +75% FYM -N), T6 (75% RDF + 25% Vermi-compost-N), T7 (50% RDF +50% Vermi-compost -N), T8 (25% RDF + 75% Vermi-compost -N) were laid out in randomized block design with four replication. Nitrogen content, uptake and qualityof wheat were significantly higher in 75% RDF + 25% VC- N which was superior as compared to other treatment.

Keywords: Effect, integrated nutrient management, content, uptake, quality, sodic, soil

Introduction
The challenge for agriculture over the coming decades will be to meet the world increasing demand for food in a sustainable way. To become weaker soil fertility and mis management of plant nutrient have made this task more difficult to complete vision 2020.Wheat (*Triticum aestivum* L.) belongs to family Poaceae is one of the most important cereal crops of the world. Among the world's most important food grain, it ranks next to rice. It is eaten in various forms by more than one billion in the world. Wheat straw is a good source of feed for a large population of the cattle in our country. Wheat has a relatively high content of niacin and thiamine that is why, wheat proteins are of special significance which are principally concerned in providing the 'gluten' which provides the frame work for sponge cellular texture of bread and baked products. Wheat is primarily grown in temperate regions at high altitude as well as medium altitude in tropical and sub-tropical regions. It ranks first in the world among the cereals both in respect of acreage 219.51 m ha and production 758.02 mt (United States Department of Agriculture, 2018) [11]. India is the second largest producer of wheat in the world. Wheat is the second most important cereal crop after rice and this is a pre-dominant winter season crop of north western plain zones and during the years of 2017-18, wheat production in India was 98.51 million tonnes from an area of 30.79 million hectares with a productivity of 3.20 tonnes ha^{-}(United States Department of Agriculture, 2018) [11]
Sodic soil reclamation is successful using inorganic amendments like gypsum and pyrite, but these amendments are expensive and not easily accessible to many poor farmers. We explored the possibilities of integrating "Organic Manure (farm yard manure and vermi-compost)", and rich in sulphur with salt-tolerant wheat varieties to improve the productivity of sodic soil. The vermicompost is the excreta of the earth warms, and farm yard manure is the product of decomposition of the liquid and solid excreta of the livestock. As the source of nutrients, these materials may also reduce the cast of fertilizer input and improve the soil Physico-chemical properties. This will make soil sustainable for crop production and prove eco-friendly. The integrated nutrient management with zinc sulphate under such conditions seems to be more beneficial for wheat cultivation with respect to yield, uptake and utilization of nitrogen and zinc along with improvement in soil health. This technology was successfully validated in farmer's fields across several villages target hot spots of sodic soil in Eastern Utter Pradesh. A farmer participatory approach was followed for technology validation and to ensure adoption. The promising wheat varieties preferred by the formers were NW1014, NW1067 and KRL99

which produced yields ranging between 3-4.5 t ha^{-1} in soil having a pH range Between 8.5 to 9.0.

In recent few years, concept of integrated nutrient management involving combined use of organic manures and chemical fertilizers has been developed. Integrated nutrient management approach to the management of plant nutrient for maintaining and enhancing soil fertility, where both natural and manmade sources of plant nutrients are used, can agriculture provide foe the food need of a world population projected to exceeds 7.5 billion by the year 2020. Due to energy crisis prohibitive cost of chemical fertilizers, their short supply and poor purchasing power of marginal and small farmers. It is imperative to develop strategy to use organic manures up to their maximum potential with proper technology to meet the shortage of fertilizers and for sustaining soil fertility on long term basis. Since organic manures are known to improve the soil health increase water retention and supply of most of the nutrients to the plants, hence the use of these in the form of farm yard manure and vermicompost will certainly boost up crop production from the soil. The organic material such as vermi-compost and farm yard manure available in abundance at nominal cost in eastern Uttar Pradesh may be the alternative for the organic manures.

Materials and methods

Integrated nutrient management studies in wheat crop under sodic soil were conducted during rabi seasons at Instructional Farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) India. The experimental site is situated in the 26.47 ^{0}N latitude, 82.12 ^{0}E longitudes and an altitude of 113 meters above mean sea level in Uttar Pradesh, India. The experiment was consisting of eight (8) treatment viz., T1 (control), T2 (100% RDF), T3 (75% RDF + 25% FYM-N), T4 (50% RDF +50% FYM- N), T5 (25% RDF +75% FYM -N), T6 (75% RDF + 25% vermi-compost-N), T7 (50% RDF +50% Vermi-compost -N), T8 (25% RDF + 75% vermi-compost -N) were laid out in randomized block design with four replication. The wheat variety NW-1014 was sown 17.5 x 5.0 cm apart used as (seedling material) seed rate of 125 kg ha^{-1}, farm yard manure and vermin-compost was used as organic source and urea, di-ammonium phosphate and zinc sulphate were used as chemical fertilizers at recommended dose of fertilizers for wheat was @ 120, 60, 40 and 25 Kg ha^{-1} N, P_2O_5, K_2O, and $ZnSO_4$**,** respectively. The data of investigation were subjected to statistical analysis by using the analysis of variance technique for randomized block design. The treatment differences were tested by "F" test of significance at 5% level of significance, critical differences was calculated to compare the significant differences between the treatments.

Results and discussion

Various levels of nitrogen as inorganic fertilizer alone and their combination with farm yard manure and vermi-compost significantly influenced the plant nitrogen content, uptake and quality of wheat over all stage (Table 1). The data in respect of nitrogen content (1.78%) of wheat crop at tillering stage showed that the treated plots with T2 (100% RDN-F) significantly increased the nitrogen content over control (without fertilizer) and other treatments. When the new plant come out of the seed, they do not have well root development and they need nutrients soon, which is obtained from chemical fertilizers instantly, whereas the organic manures are gradually decomposed, so that new plants do not have nutrients as needed, that is main reason that the chemical fertilizers application have higher nutrients in plants in the telling stage Similar findings were reported by Singh *et al.* (2005) [7]. Application of 75% RDN-F + 25% VC (T6) had increased the nitrogen content (1.86, 1.84 and 0.36%) at spike initiation stage and after harvest time (Grain and straw) and in the case of spike initiation stage nitrogen content was at par with the rest of the treatments except T1-control (1.63%), T4- 50%RDN-F+50%N-FYM (1.64%) and T5-25%RDN-F+75%N-FYM (1.61%). The nitrogen content of grain varied from 1.58 to 1.84% and nitrogen content of straw varied from 0.31 to 0.36% (Table 1). The increased nitrogen content in wheat grain and straw might be due to more uptake of nitrogen under conjoint use of organic and inorganic in form of vermi-compost and fertilizer. Similar findings were reported by Singh and Kumar (2010) [8], Singh *et al.* (2012) [9]

Table 1: Nitrogen content (%) and uptake (kg ha^{-1}) of wheat crop influenced by different treatments.

S. No	Treatments	N content (%)				N uptake (kgha^{-1})	
		TS	SIS	Grain	Straw	Grain	Straw
T_1	Control	1.51	1.63	1.58	0.31	29.64	9.71
T_2	100% RDN-F	1.78	1.83	1.81	0.35	60.18	18.43
T_3	75%RDN-+ 25%N-FYM	1.66	1.82	1.80	0.34	59.65	16.11
T_4	50%RDN-F+50%N-FYM	1.62	1.65	1.64	0.33	51.97	15.06
T_5	25%RDN-F+75%N-FYM	1.47	1.49	1.61	0.31	41.23	12.87
T_6	75% RDN-F+25% N-VC	1.67	1.86	1.84	0.36	72.02	19.73
T_7	50%RDN-F+50% N-VC	1.62	1.76	1.73	0.35	59.50	18.48
T_8	25%RDN-F+75% N-VC	1.61	1.72	1.64	0.32	56.63	16.84
	SEm±	0.05	0.05	0.07	0.02	1.45	0.40
	CD (P=0.05)	0.15	0.15	0.21	NS	4.25	1.17

Note- N= Nitrogen, %= Percentage, T= Treatment, TS= Tillering Stage, SIS= Spike Initiation Stages, RDN-F= Recommended Dose of Nitrogen through Fertilizers, FYM= Farm Yard Manure, VC=Vermi-Compost, SEm= Standard Error of Mean, CD= Critical Differences, Kgha^{-1}= Kilogram per hectare.

The maximum nitrogen uptake in grain (72.02 kg ha^{-1}) and straw (19.73 kg ha^{-1}) was observed under treatment T6- applied 75% RDN-F + 25% N through vermi-compost. At the tillering stage, the absorption of nitrogen content is increasing in T6, when organic manure and chemical fertilizers are used simultaneously, then decomposition of chemical fertilizers are very fast then organic manure, resulting in the availability of nutrients for longer period of soil to the plants. During the time of organic manure decomposition, many type carbonic acid and essential nutrients release, they are easily available to the plants. Thereby increasing wheat production and uptake of nitrogen from soil system. The similar results were reported by Singh *et al.* (2001) [6], Patil *et al*. (2008) [5], Singh *et al.* (2012) [9].

It was observed that protein content was significantly influenced by different treatments (Table 1). The control treatment had least protein content (9.88%) than rest of the treatments. The protein content in wheat grain due to application of nutrients at T5, T8, T4, T7, T3, T2, T6 were 10.06, 10.24, 10.27, 10.80, 11.24, 11.27, 11.55% in increasing order, respectively. Maximum protein content (11.55%) observed in T6- applied 75% RDN-F + 25% N through vermicompost, which was at par with T2 and T3. As nitrogen increased, the protein content also increased. Application of organic manures in the form of vermi-compost with inorganic fertilizers accelerated availability of nitrogen. The similar results were reported by Singh *et al.* (2001) [6], Patil *et al.* (2008) [5] and Singh *et al.* (2012) [9].

Test weight was not significantly affected by various treatments except T1(control) which was significantly inferior over rest of treatments. A cursory glance on the various treatments of integrated nutrient management (organic manure and chemical fertilizers) did not bring any significant variation in 1000 grain weight (g). These results are in conformity with the findings of Agrawal *et al.* (2003) [1], Singh *et al.* (2010) [8] and Singh *et al.* (2012) [9].

Table 2: Protein content, test weight and yield of wheat crop influenced by different treatments.

S. No.	Treatments	Protein content (%)	TW (g)	Yield (q ha^{-1})	
				Grain	Straw
T_1	Control	9.8	37.01	20.83	31.45
T_2	100% RDN-F	11.27	39.41	37.38	52.70
T_3	75%RDN-+ 25%N-FYM	11.24	39.35	33.19	47.46
T_4	50%RDN-F+50%N-FYM	10.27	38.61	31.68	45.63
T_5	25%RDN-F+75%N-FYM	10.06	38.05	29.29	41.54
T_6	75% RDN-F+25% N-VC	11.55	39.52	38.23	54.57
T_7	50%RDN-F+50% N-VC	10.80	38.85	35.44	52.81
T_8	25%RDN-F+75% N-VC	10.24	38.32	33.06	52.73
	SEm±	0.12	0.72	0.97	1.39
	CD (P=0.05)	0.36	NS	2.84	4.08

Note- T= Treatment, TW= Test weight, RDN-F= Recommended Dose of Nitrogen through Fertilizers, FYM= Farm Yard Manure, VC=Vermi-Compost, SEm= Standard Error of Mean, CD= Critical Differences, g= Gram and qha^{-1}= Quintal per Hectare.

The data pertaining to maximum yield of wheat grain and straw was observed under treatment T6, minimum grain yield and straw yield was observed under treatment T1(control). The beneficial effect of T6-(75% RDN-F + 25% N vermi-compost) on grain and straw yield can be very well explained, in the light of the fact that vermi-compost along with chemical fertilizers application contributed to higher grain and straw yield. These results were in conformity with Kumawat and Jat (2006) [4], Kumar *et al.* (2010) [3] and Ghanshyam *et al.* (2010) [2].

Conclusion

On the basis of experimentation, it was concluded that combine use of inorganic+ organic application under treatment six (75% RDN-F + 25% VC-N) gave better results in respect to nitrogen content, uptake and quality of wheat crop and second-best treatment is treatment two (100% RDN-F). The integration of inorganic fertilizers along with organic manure has a positive effect on thenitrogen content, uptake and quality of yield plants.

References

1. Agrawal SS, Singh A, Dwivedi G. Effect of Vermicompost, FYM and chemical fertilizers on growth and yield of wheat (*Triticum aestivum* L. var. HD 2643). Plant Archives. 2003; 3(1):1-14.
2. Ghanshyam, Rakesh Kumar, Jat RK. Productivity and soil fertility as affected by organic manures and inorganic fertilizers in greengram (*Vigna radiate*)-wheat (*Triticum aestivum*) system. Indian J. of Agron. 2010; 55(1):16-21.
3. Kumar A, Singh J, Raj D, Manuja S. Integrated nutrient management in buck wheat (Fagopyremtataricum) under dry temperate condition of North-Western Himalaya XIX national symposium on "Response management approaches towards livihood security" 2-4 December, Bangalore, Karnataka, 2010, 106p.
4. Kumawat PD, Jat NL, Yadav SS. Effect of organic manure and nitrogen fertilization on growth yield and economics of barley. J. of Agric. Sci. 2006; 76(4):226-269.
5. Patil CG, Patil NB, Awaknavar JS, Ninganur, Hunge R. Effect of organic manures on growth, seed yield and quality of wheat, Karnataka. Journal of Agri. Science. 2008; 21(3):366-368.
6. Singh KP, Nehra AS, Hooda IS. Effect of integrated nutrient management on growth and yield of wheat (*Triticum aestivum*). Indian J. of Agron. 2001; 46 (1):112-117.
7. Singh LN, Singh RKK, Singh AH, Chhagte Z. Efficiency of urea in integrated with Azolla and vermicompost in rainfed rice (*Oryzasativa* L.), Production and their residual effect on soil properties. Indian J. Agri. 2005; 75(1):44-45.
8. Singh RV, Kumar R. Effect of organic and inorganic fertilizers on growth and yield and quality and nutrient uptake of wheat under late sown condition. Prog. Of Agric. 2010; 10(2):341-344.
9. Singh R, Vivek Tomar. Integrated nutrient management in Basmati rice under transplanted condition in rice–wheat cropping system. Progressive Agricultures. 2012; 12(2):421-423.
10. Khan JA, Tiwari OP, Shrivastava GK, Singh AP. Effect of irrigation schedules, levels and split application of nitrogen on yield attributes and yield of late sown wheat. Ann. Agric. Res. 2000; 21(4):561-563.
11. United States Department of Agriculture, World Agricultural Production, Circular series, WAP, 2018, 8-18.