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Impact of different nutrient sources on yield, nutrient uptake and quality of wheat (*Triticum aestivum*)

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Abstract
A field experiment was conducted at the AICRP on Integrated Farming System Field, Department of Soil Science and Agriculture Chemistry, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during *rabi* season 2019-20 to impact of different nutrient sources on yield, nutrient uptake and quality of wheat. The experiment was laid out in randomized block design with seven treatments and three replications. The applied different level different response showed. The highest plant height and spike length observed (78.20 cm and 8.87 cm respectively) in the treatment T_2-100% RDF through chemical fertilizers. The highest grain yield, straw yield, test weight and protein content recorded (2496.24 kg ha^{-1}, 4375.47 kg ha^{-1}, 44.60 g and 13.14% respectively) in the treatment T_6- 25% RDF through chemical fertilizer + 100% RDF through organic manures, over the 100% RDF through chemical fertilizers. However maximum nitrogen uptake by grain and straw (56.66 kg $ha^{-1}$and 24.37 kg ha^{-1}), phosphorous uptake by grain and straw (31.67 kg $ha^{-1}$and 11.79 kg ha^{-1}) and potassium uptake by grain and straw (12.82 kg $ha^{-1}$and 30.86 kg ha^{-1} respectively) in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures. Further, the combined use of organic and inorganic nutrient sources gave highest availability of nutrient compared to other treatments. Thus organic and inorganic nutrient sources improved yields, quality of grain as well as improved soil health.

Keywords: Plant height, spike length, vermicompost, neem cake, quality, uptake

Introduction
Wheat (*Triticum aestivum* L.) is a most important cereal crop in the world, originated from South West Asia. It is second most staple crop in India after rice. In world, wheat is grown on an average area of 215.90 million ha. with 765.77 million tones production and 3.5 tones ha^{-1} productivity (FAO, 2019). In India wheat growing area 29.31 million ha. with production of 103.60 million tones during 2018-19 with the average productivity of 3533 kg ha^{-1}(Indiastat.com, 2018-19). In India major Wheat growing states are Uttar Pradesh, Madhya Pradesh, Punjab, Haryana, and Bihar. The highest productivity of Wheat in the state Punjab, whereas Maharashtra stand 8th rank. In Maharashtra wheat cultivated area 8.34 lakh ha, with production 12.49 lakh tones and productivity is 1497 Kg ha^{-1} during 2018-19 (Indiastat.com, 2018-19). It provided 20 percent of total food and it content 12-15% percent protein, 3.2% fat, 67% carbohydrate, the major sources of dietary fiber in human nutrition since decades.
Increase the population of world the need of crop demand increases. Nowadays practice modern agriculture that included high yielding varieties require more nutrients and used the chemical fertilizers like Urea, DAP, SSP and MOP that are not much suitable for soil health and sustainable crop production. Most of the chemical fertilizers influence the soil health and change the soil fertility parameter and also influence the microbial properties of soil ecosystem. Chemical fertilizer produced higher nutrients and beside change soil ecosystem. Different soil microorganisms grown different soil reaction like bacteria, actinomycetes well grown neutral to slightly alkali soil and fungi in acidic soil.
Different organic manures like FYM, vermicompost, poultry manures, neem cake, ground nut cake used with inorganic fertilizers increase production and also maintain soil fertility long term basis (Arbad *et al*., 2014) organic manures are good sources of plant available nutrients. The organic manures increase the microbial activity, enzymatic activity and also increases the mineralization process (Saiyad *et al*., 2014) [12]. Thus judicious use of organic and inorganic nutrient sources helps in sustain production of wheat.
Uptake of nutrient depend upon the availability of nutrient in soil. When inorganic fertilizers applied in soil it increases the availability but it not long term basis, organic manures increase the C:N ratio and decrease the availability of nutrient and it slowly available for plant.

Combined use of organic and inorganic nutrient sources maintain productivity as well as quality of crop.

Most of the crops uptake of the nitrogen in the form of nitrate that is highly leachable and reaching ground water and increase the concentration of nitrate. The permissible limit of nitrate less than 10 mg/L according to WHO. Greater than 10 mg/L of nitrate in ground water that is poisonous for human being like blue baby syndrome in Punjab, Haryana. Inorganic fertilizer also increases the concentration of heavy metals soil environment that is harmful for crop growth as well as human being (Verma *et al*., 2005) [17] reported that the organic and inorganic fertilizers integration used will not only sustain the crop production but also improve soil health and increases nutrient use efficiency. During past intensive agriculture involving exhaustive high yielding varieties has led to heavy withdrawal of nutrients from soil caused nutrient deficiency come in crop. Generally Wheat crop grown in intensive cropping system with higher use of inorganic fertilizers (Yadav *et al*., 2018) [19].

Materials and Methods

The experiment was conducted during *rabi* season 2019-20 at the AICRP on Integrated Farming System Field, Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experimental site lies between 19 ^{0} 46^0 North Latitude and 76^0 46^0 East longitude, having elevation of 408.46 above the mean sea level. This region has a semi- arid tropical climate, where the annual average temperature varies from 33.50 ^{0}c in winter to 43.70 ^{0}c in summer and means minimum temperature various from 19.50- 27.70 ^{0}C. The soil of this region are medium to deep black color. The experiment was laid out in Randomized Block design, seven treatments with three replications *viz.*, T_1-100% RDF through organic manures (1/3 FYM+1/3 Vermicompost + 1/3 Neem cake.), T_2-100% RDF through chemical fertilizer,T_3-75% RDF through chemical fertilizer + 25% RDF through organic manures (1/3 FYM+1/3 Vermicompost + 1/3 Neem cake.), T_4-50% RDF through chemical fertilizer + 50% RDF through organic manures (1/3 FYM+1/3 Vermicompost + 1/3 Neem cake.), T_5-25% RDF through chemical fertilizer + 75% RDF through organic manures (1/3 FYM+1/3 Vermicompost + 1/3 Neem cake.), T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake) and T_7-Control (without any fertilizer). The nitrogen content from the grain samples was estimated by Micro-kjedhals method AOAC (1975) [1] and N content was multiplied by 6.25 to get percent crude protein. The phosphorus was estimated by vanadomolybdophosphoric acid yellow colour method prepared using spectrophotometer, Jackson (1973) [10]. The di-acid extract was used for potassium determination. It was determined on flame photometer as suggested by Jackson (1973) [9].

Statically analyzed as per the method given in "Statistical method for Agricultural Workers" by Panse and Sukhatme (1985) using computer program. Appropriate Standard error {SE} were worked out, critical difference (C.D) at 5% and CV were calculated.

Results and Discussion

Impact of different nutrient sources on plant height, spike length, grain yield and straw yield.

Plant height

The data presented in Table 1 revealed that the various level of nutrients applied through fertilizer, manures alone and their combination with FYM, vermicompost, neem-cake influenced the plant height significantly. It is further evident from the perusal of data that the highest plant height (78.20 cm) was recorded in the treatment T_2 (100% RDF through chemical fertilizer) which was statistically at par with T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures (75.46cm) followed by treatments T_3-75% RDF through chemical fertilizer + 25% RDF through manures (74.37 cm) and T_1 -100% RDF through organic manures (74.24 cm), while lowest plant height recorded in T_7 –control treatment (69.89 cm). The increase in plant height under inorganic fertilizer level alone and combination with organic and inorganic sources due to increasing availability of nutrients to the plant. The similar results were found by Yadav *et al*., (2017) [18] reported that the highest plant height (93.2cm) recorded in the treatment 50% RDF + 50% N-FYM+PSB.

Table 1: Impact of different nutrient sources on plant height, spike length, grain yield and straw yield of wheat

Sr. No.	Treatments	Plant height (cm)	Spike length (cm)	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})
T_1	100% RDF through organic manures (1/3 FYM+1/3 Vermi compost+ 1/3 Neem cake)	74.24	7.66	2106.41	3892.91
T_2	100% RDF through chemical fertilizer	78.20	8.87	2414.12	4307.56
T_3	75% RDF through chemical fertilizer + 25% RDF through organic manures (1/3 FYM+1/3 Vermi compost+ 1/3 Neem cake)	74.37	8.14	2314.01	4045.35
T_4	50% RDF through chemical fertilizer + 50% RDF organic manures (1/3 FYM+1/3 Vermi compost+ 1/3 Neem cake)	72.34	8.10	2232.15	4011.00
T_5	25% RDF through chemical fertilizer + 75% RDF through organic manures (1/3 FYM+1/3 Vermi compost+ 1/3 Neem cake)	70.45	8.09	2206.66	4113.47
T_6	25% RDF through chemical fertilizer + 100% RDF through organic manures (1/3 FYM+1/3 Vermi compost+ 1/3 Neem cake)	75.46	8.45	2496.24	4375.47
T_7	Control (without any fertilizer)	69.89	6.52	1979.87	3824.34
	S.Em.±	1.51	0.14	84.78	98.67
	C.D. at 5%	4.65	0.42	261.27	304.00
	C.V. %	3.56	2.96	6.53	4.19

Spike length

The spike length of wheat presented in Table 1. Maximum spike length (8.87cm) observed in the treatment T_2 (100% RDF through chemical fertilizer) which was statistically at par with the treatment T_6 (25% RDF through chemical+100% RDF through organic manures) having spike length (8.45cm) and minimum spike length (6.52cm) was observed under the treatment T_1 (control). The combination of organic and inorganic fertilizers increased spike length due to may be rapid decomposition and mineralization organic matter and

nutrient available to plant. The similar results also found by Ahmad *et al*., (2012) [2] reported that the maximum spike length (13.65 cm) was recorded in the treatment 100% RDF + compost 300 kg ac^{-1}

Grain yield

The data on wheat grain yield presented in Table 1. Maximum grain yield (2496.24 kg ha^{-1}) was obtained in the treatment T_6 -25% RDF through chemical fertilizer + 100% RDF through organic manures, which was statistically at par with the treatment T_2 -100% RDF through chemical fertilizer (2414.12 kg ha^{-1}), T_3-75% RDF through chemical fertilizer + 25% RDF through organic manures (2314.01 kg ha^{-1}) while minimum grain yield was recorded (1979.87 kg ha^{-1}) in the treatment T_7-control (without any fertilizers). The increases in the grain yield might be due to adequate and balance proportion of plant nutrient supplied as per need during growth period which was ultimately led to increased grain yield. The similar results found by Devi *et al*., (2011) [4], and reported that the application of (100% RDF + vermicompost @ 1t ha^{-1}+PSB) given highest grain yield (4.74 t ha^{-1}).

Straw yield

The data on effect of different fertilizer level produced significantly higher straw yield in combined application of organic and inorganic as well as alone inorganic fertilizers Table 1 maximum straw yield (4375.47 kg ha^{-1}) was obtained in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures, which was statistically at par with the treatment T_2-100% RDF through chemical fertilizer (4307.56 kg ha^{-1}) and T_5 -25% RDF through chemical fertilizer + 75% through organic manures (4113.25 kg ha^{-1}) while minimum straw yield was recorded (3824.34 kg ha^{-1}) in the treatment T_7-control. The higher straw yield of wheat crop with combined application of nutrients may be due to the favorable soil physicochemical properties (like soil structure, water holding capacity, pH, and EC) and synchronize releases of nutrients throughout the crop growth period. This results also confirm by Singh *et al*., (2018) [15] and reported that the maximum straw yield (62.62 q ha^{-1}) recorded in the treatment (100% RDF+ VC 2 t ha^{-1}+ PSB) and minimum straw yield (46.98 q ha^{-1}) where applied (50% RDF).

Table 2: Impact of different nutrient sources on test weight (1000 grain weight) and protein content of wheat grain

Sr. No.	Treatments	Test weight (g)	Protein content (%)
T_1	100% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	44.14	11.54
T_2	100% RDF through chemical fertilizer.	43.92	11.97
T_3	75% RDF through chemical fertilizer + 25% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	43.24	12.56
T_4	50% RDF through chemical fertilizer + 50% RDF organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	43.61	12.53
T_5	25% RDF through chemical fertilizer + 75% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake.)	43.66	12.86
T_6	25% RDF through chemical fertilizer + 100% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	44.60	13.14
T_7	Control (without any fertilizer)	42.50	10.84
	S.Em.±	0.30	0.45
	C.D. at 5%	0.93	1.39
	C.V. %	1.19	6.4

Influence of different nutrient sources on test weight and protein content of wheat grain

Test weight of wheat grain

The data shown in Table 2. The maximum test weight was recorded in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures (44.60 g) which was statistically at par with treatment T_1-100% RDF through organic manures (44.14g) and T_2-100% RDF through chemical fertilizer (43.92g).While the minimum test weight (42.50g) in the treatment T_7-control. The maximum 1000 grain weight was found in the treatment where applied organic and inorganic nutrient combination and also alone inorganic, organic sources of plant nutrient were applied in comparison to control. The beneficial effect on grain weight might be assigned the fact that after proper decomposition and mineralization, this manures supplied of plant nutrient and also had solubilizing effect on fixed nutrient in soil. The similar results also found by Singh *et al*., (2017) [16] and reported the test weight range (28.7-39.7g), the maximum test weight was recorded (39.7g) where applied (100% NPK+FYM+ PSB+ Azotobacter + Zn + Fe + Mn) and minimum (28.7g) in control.

Protein content of wheat grain

The data presented in the Table 2. The application of inorganic, organic nutrient sources alone and combination of organic and inorganic nutrient in different level. The significantly highest protein content was recorded (13.14%) in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures, which was statistically at par with T_2-100% RDF through chemical fertilizer (11.97%), T_3-75% RDF through chemical fertilizer + 25% RDF through organic manures (12.56%), T_4-50% RDF through chemical fertilizer + 50% organic manures (12.53%), and T_5-25% RDF through chemical fertilizer + 75% through organic manures (12.86%), while lowest protein content was recorded (10.84%) in T_7-control treatment. The protein content in a wheat grain highest where fertilizers were applied combination with organic and inorganic nutrient sources and also alone inorganic nutrient sources might be due to rapid mineralization increases the availability of nitrogen to the plant. Similar results were found by Sharma *et al.*, (2013), and reported that the highest protein content was recorded (10.45%) where applied (75% NPK+ FYM+ Azotobacter + PSB+ Zn) and lowest (9.16%) where applied (50% NPK).

Table 3: Impact of different nutrient sources on nitrogen, phosphorous and potassium uptake by grain and straw

Sr. No.	Treatments	N uptake (kg/ha)		P uptake (kg/ha)		K uptake (kg/ha)	
		Grain	Straw	Grain	Straw	Grain	Straw
T_1	100% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	42.16	16.89	26.35	9.58	12.17	23.49
T_2	100% RDF through chemical fertilizer.	50.51	20.55	26.71	10.09	12.54	27.49
T_3	75% RDF through chemical fertilizer + 25% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	48.86	23.74	18.12	9.60	10.57	23.37
T_4	50% RDF through chemical fertilizer + 50% RDF organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	46.56	23.33	24.60	9.71	10.96	26.54
T_5	25% RDF through chemical fertilizer + 75% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	49.99	24.18	29.46	10.17	11.10	26.98
T_6	25% RDF through chemical fertilizer + 100% RDF through organic manures (1/3 FYM+1/3 Vermicompost+ 1/3 Neem cake)	56.66	24.37	31.67	11.79	12.82	30.86
T_7	Control (without any fertilizer)	37.76	15.58	17.05	6.28	8.03	20.51
	S.Em.±	2.41	1.19	1.15	0.42	0.20	0.67
	C.D. at 5%	7.43	3.67	3.55	1.30	0.61	2.05
	C.V. %	8.8	9.72	8.02	7.6	3.08	4.51

Nitrogen uptake by wheat grain

The data presented in Table 3 indicated that the among the different level application of nutrient, the significantly maximum nitrogen uptake by wheat grain was recorded (56.66 kg ha^{-1}) in the treatment T_6- 25% RDF through chemical fertilizer + 100% RDF through organic manures which was statistically at par with the treatment T_2-100% RDF through chemical fertilizer (50.51 kg ha^{-1}) and T_5-25% RDF through chemical fertilizer + 75% through organic manures (49.99 kg ha^{-1}) while the minimum nitrogen uptake by grain was recorded 37.76 kg ha^{-1}) in the treatment T_7-control. The higher nitrogen uptake by wheat grain due to higher availability of nitrogen in adequate amount, which supplied though organic manures and inorganic fertilizer combined during development and reproductive stage of crop. The similar results were reported by Fazily *et al*., (2019) [5] who revealed that the nitrogen uptake by grain range 36.42-115.01 kg ha^{-1}, the maximum nitrogen uptake by grain (115.01 kg ha^{-1}) where applied (100% RDN + 25% VC) and minimum nitrogen uptake (36.42 kg ha^{-1}) in control plot.

Nitrogen uptake by wheat straw

It is evident from the 3 that the integrated use of chemical fertilizer and organic manures had significantly positive impact on nitrogen uptake by straw over the other treatments. The highest nitrogen uptake by straw (24.37 kg ha^{-1}) was recorded in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures which was statistically at par with the treatment T_3-75% RDF through chemical fertilizer + 25% RDF through organic manures (23.74 kg ha^{-1}), T_4-50% RDF through chemical fertilizer + 50% organic manures (23.33 kg ha^{-1}) and T_5-25% RDF through chemical fertilizer + 75% RDF through organic manures, while the lowest nitrogen uptake by straw was recorded (15.58 kg ha^{-1}) in the treatment T_7-control.

The nutrient uptake increased by wheat straw in the combined application of inorganic fertilizer and organic manures. This may be increase the soil available nitrogen due to improvement of soil physical structure. Similar results also found by Ghosh *et al*., (2020) [6] who reported the nitrogen uptake by wheat straw range from (9.68-30.16 Kg ha^{-1}), the highest nitrogen uptake by straw (30.16 kg ha^{-1}) in the treatment 50% RDN (through organic) + 50% RDN through urea and lowest (9.68 Kg ha^{-1}) in control plot.

Phosphorous uptake by wheat grain

Perusal of the data from Table 3, revealed that uptake of phosphorous by wheat grain increased significantly in various treatments over control. The uptake of phosphorous by grain increased significantly when combined used of organic and inorganic nutrient sources. The maximum phosphorous uptake by grain was recorded (31.67 kg ha^{-1}) in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures, which was statistically at par with the treatment T_5-25% RDF through chemical fertilizer + 75% RDF through organic manures (29.46 kg ha^{-1}), while the lowest phosphorous uptake by grain was recorded (17.05 kg ha^{-1}) in the treatment T_7-control. The increase the uptake of phosphorus by grain may be due to release more nutrient applied as well as native soil nutrient that available for plant. Similar results also found by Sharma *et al*., (2013) [13] reported maximum phosphorus uptake by wheat grain (28.44 kg ha^{-1}) where applied (75% RDF+ FYM+ Azotobacter + PSB).

Phosphorous uptake by wheat straw: The data related to phosphorous uptake by wheat straw is presented in Table 3 indicate that the different treatment showed various uptake of phosphorous by wheat straw. The significantly highest phosphorous uptake by wheat straw was recorded (11.79 kg ha^{-1}) in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures, where lowest was recorded in the (6.28 kg ha^{-1}) in the treatment T_7 –control. The similar findings reported by Reena *et al*., (2017) [11], that the highest phosphorous uptake by wheat straw + grain (33.58 kg ha^{-1}) where applied (75% RDF+10t FYM ha^{-1}+S+B). Available nutrient increased due to combine use of organic with inorganic nutrient sources may be attributed nutrient to mineralization the organic matter rapidly.

Potassium uptake by wheat grain

The data given in revealed that among the different treatments significantly highest potassium uptake by wheat grain was recorded (12.82 kg ha^{-1}) in the treatment T-6 (25% RDF through chemical fertilizer + 100% RDF through organic manures), which was statistically at par with treatment T_2-100% RDF through chemical fertilizer (12.54 kg ha^{-1}) and potassium uptake by wheat grain (8.03 kg ha^{-1}) in the treatment T_7 -control.

The uptake of potassium wheat grain significantly higher in combined application of nutrient and alone inorganic sources. The combined treatment higher nutrient uptake may be due to high nutrient availability by rapid decomposition organic nutrient sources and that easily available to plant. The similar results also found by Fazily *et al*., (2019) [5] who revealed that integrated used organic manures with RDF increase the root CEC and improve the uptake of potassium grain (29.21 kg ha^{-1}) where applied (100% RDN + 25% N through VC).

Potassium uptake by wheat straw

The potassium is most important macronutrient in plant which content about 1% by weight basis, potassium help to disease resistance, carbohydrate synthesis, protect from logging of crop by increase the hardness of crop.

The data presented in Table 3. The higher potassium uptake by wheat straw was recorded(30.86 kg ha^{-1}) in the treatment T_6-25% RDF through chemical fertilizer + 100% RDF through organic manures, and lower uptake of potassium was recorded (20.51 kg ha^{-1}) in the treatment T_7-control. Similar results also found by Shillode *et al*., (2015) [14] reported the highest total potassium uptake by grain and straw of safflower was recorded (173.88 kg ha^{-1}) where applied 100% RDF + Azospirillum + PSB, and lowest potassium uptake was recorded (71.32 kg ha^{-1}) in control. The increase the uptake of straw combined application of nutrient may be positive interaction of nutrient availability.

Conclusion

It can be concluded from the above experiment that cultivation of crop, organic and inorganic nutrient sources with recommended dose of fertilizers increase production, productivity and protein content as well as maintain soil health long term basis.

References

1. AOAC. Association of official method of analysis Ed.12 Washington, D.C., 1975.
2. Ahmad M, Afzal M, Ahmad A, Ahmad AUH, Azeem MI. Role of organic and inorganic nutrient sources in improving wheat crop production. Cercetari Agronomice in Moldova. 2012;1(153);15-21
3. Arbad BK, Syed Ismail, Dhawan AS. Influence of long term use of farm yard manure and inorganic fertilizer on grain yield and nutrient availability in Vertisol under soyabean- safflower sequence cropping. Legume Res. 2014;37(6):600-606.
4. Devi KN, Singh MS, Singh NG, Athokpam HS. Management on growth and yield of wheat (*Triticum aestivum* L.). Journal of Crop and Weed. 2011;7(2):23-27.
5. Fazily Tamim, Thakral SK, Dhaka AK, Sharma MK. Effect of integrated use of inorganic and organic sources of nitrogen on nutrient uptake by wheat and soil fertility. International Journal of Current Advanced Research. 2019;9(2)(B):21201-21204.
6. Ghosh S, Paul J, Dwivedi GK, Pareek K, Singh R. Impact of integrated nutrient management practices on nutrient uptake and yield of wheat under poplar based agroforestry. Journal of Pharmacognosy and Phytochemistry. 2020;9(3):697-699.
7. https//www.fao.org
8. https//www.indiastat.com
9. Jackson ML. Soil Chemical Analysis, Prentis Hall of India Pvt. Ltd. New Delhi, 1973.
10. Panse UG, Sukhatme PV. Statistical Methods for Agricultural Workers. I.C.A.R. Pub., New Delhi, 1985.
11. Reena SB, Pandey DD, Tiwari RC, Nigam Ajay, Singh Kumar, Kumar Sateesh. Effect of integrated nutrient management on yield and nutrient uptake of wheat and soil health. Int. Arch. App. Sci. Technology. 2017;8(3):25-28.
12. Saiyad MM. Effect of liquid biofertilizers on yield attributes of brinjal (*Solanum melongena* L.). Trends in Biosciences. 2014;7(22):3754-3756.
13. Sharma GD, Thakur Risikesh, Som Raj, Kauraw DL, Kulhare SP. Impact of integrated nutrient management on yield, nutrient uptake, protein content of wheat and soil fertility in a Typic Haplustert. An International Journal of Life Sciences. 2013;8(4):1159-1164,
14. Shillode GU, Patil DS, Patil SD, Joshi SR. Soil properties and yield of safflower as influence by different fertilizers. Research Journal of Agriculture and Forestry Sciences. 2015;4(2):13-16.
15. Singh Gurwinder, Kumar Santosh, Singh Gurmeet, Navdeep Singh. Effect of integrated nutrient management on nutrient uptake and grain yield of wheat (*Triticum aestivum* L.) under irrigated conditions. Journal of Pharmacognosy and Phytochemistry. 2018;8(1):1077-1080
16. Singh Vineet, Rana NS, Kumar Ravindra, Vivek, Dhyani BP, Naresh RK *et al*. Integration of 0rganic and mineral nutrient sources enhances wheat productivity, soil health and profitability in western Uttar Pradesh. Int. J. Curr. Microbiol. App. Sci. 2017;6(10):3089-3097.
17. Verma A, Nepalia V, Kanthaliya PC. Effect of continuous cropping and fertilization on crop yields and nutrient status of a Typic Haplustept. Journal of the Indian Society of Soil Science. 2005;53:365.
18. Yadav Abhimanyu, Kumar Adesh, Prakash Ved, Kumar Neeraj, Tiwari Ashutosh, Yadav RK *et al*. Effect integrated nutrient management on soil properties, yield attributes and yield of wheat (*Triticum aestivum* L.). Int. J Curr. Microbiol. App. Sci. 2017;6(10):225-228.
19. Yadav Kamlesh, Kumar, Singh, Nishant SP, Kumar Vineet. Effect of integrated nutrient management on soil fertility and productivity on wheat Crop. International Journal of Experimental Agriculture. 2018;24(2):1-9.