Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5815

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (4):** 2165-2168 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Influence of Various Nutrient Sources on Nutrient Content Uptake of Wheat in Pearlmillet-Wheat Cropping Sequence

Babli, Priti Malik*, Pawan Kumar and Ajay Singh

Department of Agronomy, CCS Haryana Agricultural University, Hisar-125004

*Corresponding Author E-mail: priti.malikhau@gmail.com

Received: 30.06.2017 | Revised: 29.07.2017 | Accepted: 3.08.2017

ABSTRACT

A field experiment having randomized complete block design with three replications was conducted at agronomy Research Farm of CCS Haryana Agricultural University, Hisar (India) during the year 2013-14 to assess the effect of various nutrient sources on nutrient content uptake in grain and straw of wheat under pearlmillet-wheat cropping system. Highest nitrogen concentration and uptake was recorded in grain and straw of wheat in T_6 where, application of 50% recommended dose of Nitrogen and phosphorus + 50% nitrogen through FYM in kharif (pearlmillet) and 100% nitrogen and phosphorus in rabi (wheat). Phosphorus and potassium concentration and uptake was also found maximum in grain and straw of wheat in T_6. RDF of N and P in Combination of Farm yard manure enhances the availability of nutrients to the plants and increase the cation exchange capacity of root which consequently cause higher absorption by the crop.

Key words: *Uptake, pearlmillet, wheat, nutrient sources*

INTRODUCTION

Pearlmillet is grown as a dual purpose crop for both food and fodder. It is used as a feed in poultry and dairy and it is important drought tolerant cereal crop. Pearlmillet (*Pennisetum glaucum*)-wheat (*Triticum aestivum*) cropping sequence is the most popular and prominent under arid and semiarid areas of India. The contribution of this cropping system in total food grain production is considerably large and it is very exhausted in nature. The loss of soil fertility due to continuous depletion of nutrients by crop without replenishment poses environmental problems. Continuous use of high analysis fertilizers accelerated mining of micro and secondary nutrients which brought down the productivity of soil, deterioration of soil health and potentially impair the soil microbial activity.

The productivity of soil and sustainability of crops in an intensive cropping system in north-western India is improved by judicious use of organic and inorganic sources of nutrients of plants. So, neither organic sources nor the chemical fertilizers alone can achieve production sustainability. Keeping this in view, present study was, therefore, undertaken to assess the effect of integrated nutrient management system on concentration and uptake in grain and straw of wheat in pearlmillet-wheat cropping sequence.

Cite this article: Babli, Malik, P., Kumar, P. and Singh, A., Influence of Various Nutrient Sources on Nutrient Content Uptake of Wheat in Pearlmillet-Wheat Cropping Sequence, *Int. J. Pure App. Biosci.* **5(4):** 2165-2168 (2017). doi: http://dx.doi.org/10.18782/2320-7051.5815

MATERIALS AND METHODS

The field experiment was carried out to study the effect of various nutrient sources on nutrient content uptake and soil health studies of wheat under pearlmillet-wheat cropping system in sandy loam of Hisar during the year 2013-14 at Agronomy Research Area at CCS Haryana Agricultural University. The soil of experimental site had 7.87 pH, containing 191.53 kg/ha available N, 17.25 kg/ha available P and 288 kg/ha available K i. The experiment was thrice replicated with twelve treatments and carried out in randomized block design. The treatments were: - T_1 - Control (no fertilizer); T_2 – 50 % recommended NP to pearlmillet and wheat through fertilizers; T_3 – 50% recommended NP to pearlmillet and 100% recommended NP to wheat through fertilizers; T_4 – 75% recommended NP to pearlmillet and wheat through fertilizers; T_5 – 100% recommended NP to pearlmillet and wheat through fertilizers; T_6 – 50% NP through fertilizers + 50% N (through FYM) to pearlmillet and 100% NP to wheat through fertilizers; T_7 – 75% NP through fertilizers + 25% N (through FYM) to pearlmillet and 75% NP to wheat through fertilizers; T_8 – 50% NP + 50% N (wheat straw) to pearlmillet and 100% NP to wheat through fertilizers; T_9 – 75% NP + 25% N (wheat straw) to pearlmillet and 75% NP to wheat through fertilizers; T_{10} – 50% NP + 50% N (*Sesbania spp*.) to pearlmillet and 100% NP to wheat through fertilizers; T_{11} – 75% NP + 25% N (*Sesbania spp*.) to pearlmillet and 75% NP to wheat through fertilizers and T_{12} – farmers practice. The recommended levels of nitrogen and phosphorus were 125 and 62.5 kg/ha for pearlmillet and 150 and 60 kg/ha for wheat. The pearlmillet variety used was HHB 197 with 5 kg seed/ha, keeping row spacing of 45 cm. In wheat, variety WH 711 was sown with 125 kg seed/ha keeping row spacing of 20 cm. The nitrogen content in different organic materials was determined each year and the amount of these materials required for substituting a specified amount of nitrogen as per the treatment was calculated. The organic sources of nutrients viz., FYM, green manure of sesbania and wheat straw were incorporated in soil at 30, 36 and 30 days, respectively, before sowing of pearlmillet crop. The recommended nitrogen and phosphorus were applied through urea and DAP, respectively. One post sowing irrigation was applied during both years to pearlmillet. Similarly, in wheat five irrigations were applied each year. Recommended package of practices were followed in both the crops for other agronomic operations. To determine NPK content in grain and straw oven dried grain and straw sample weighed 0.2 and 0.5 g, respectively were digested in diacid mixture of H_2SO_4 and $HClo_4$ in the ratio of 9:1 for nutrient (N, P and K) estimation. After digestion, a known volume was made with distilled water and stored in well-washed plastic bottles after filtration through whatman filter paper no. 42. Using different methods N, P and K content in grain and in straw were determined. NPK concentration and uptake in grain and straw obtained under wheat crop in pearlmillet-wheat sequence were statistically analyzed using the *f* test for treatment comparisons.

RESULTS AND DISCUSSION

Nitrogen concentration and uptake in grain and straw of wheat

Nitrogen concentration (1.30%) and uptake (71.37 kg/ha) in grain was obtained higher in T_5 which is significantly better over other chemical treatments except T_6. In T_6 (50% RD-NP + 50% N through FYM in pearlmillet and 100% RD-NP in wheat) recorded highest nitrogen concentration (1.33%) and uptake (74.24 kg/ha) (Table 1). Maximum nitrogen concentration (0.48 %) and uptake (26.75 kg/ha) was recorded in wheat straw of treatment number T_6. This might be due to more availability of nutrients and consequently higher absorption because of increase in root cation exchange capacity. Application of FYM significantly increased N uptake and grain and straw yields of wheat.

Table1. Effect of different treatments on nitrogen concentration (%) and uptake (kg/ha) in grain and straw of wheat

Treatments	Grain		Straw		Total uptake
	Concentration	Uptake	Concentration	Uptake	
T_1	1.25	14.88	0.26	2.62	17.5
T_2	1.26	45.49	0.28	8.38	53.87
T_3	1.27	59.04	0.31	15.76	74.80
T_4	1.26	58.46	0.28	10.39	68.85
T_5	1.30	71.37	0.45	26.24	97.61
T_6	1.33	74.24	0.48	26.75	100.99
T_7	1.27	63.96	0.32	17.52	81.48
T_8	1.28	65.63	0.38	24.20	89.83
T_9	1.26	59.75	0.35	16.22	75.97
T_{10}	1.29	69.93	0.39	25.80	95.73
T_{11}	1.26	59.84	0.36	27.31	87.15
T_{12}	1.27	64.58	0.37	17.85	82.43
SEm±	0.01	1.0	0.01	0.3	1.2
CD (P=0.05)	0.03	2.8	0.03	0.9	3.6

Phosphorus concentration and uptake in wheat grain and straw

Higher phosphorus concentration (0.4%) and uptake (22.33) were recorded in wheat grain in T_6 which are significantly better over other treatments. T_6 (0.07%), T_8 (0.07%) and T_{10} (0.07%) (Table 2) recorded similar phosphorus concentration in straw and significantly better over all other treatments. Lowest value of phosphorus in straw was obtained in control (unfertilized treatment). Highest phosphorus uptake (4.68 kg/ha) was recorded in straw in T_6. Application of fertilizers along with manures improved initial process of plant growth such as cell division, number of root hairs etc enabling the plant to have healthy root system that helped in better absorption of nutrients and moisture from soil[1].

Table 2: Effect of different treatments on phosphorus concentration (%) and uptake (kg/ha) in grain and straw of wheat

Treatments	Grain		Straw		Total uptake
	Concentration	Uptake	Concentration	Uptake	
T_1	0.2	2.38	0.04	0.52	2.9
T_2	0.3	10.83	0.04	1.68	12.51
T_3	0.3	13.94	0.05	2.63	16.57
T_4	0.3	13.92	0.05	2.60	16.52
T_5	0.4	21.96	0.07	4.59	26.55
T_6	0.4	22.33	0.07	4.68	27.01
T_7	0.3	15.11	0.06	3.50	18.61
T_8	0.3	15.38	0.07	4.23	19.61
T_9	0.3	14.23	0.05	2.70	16.93
T_{10}	0.3	16.26	0.07	4.52	20.78
T_{11}	0.3	14.25	0.05	2.73	16.98
T_{12}	0.30	15.25	0.06	3.57	18.82
SEm±	0.009	0.4	0.003	0.03	0.6
CD (P=0.05)	0.020	1.1	0.009	0.11	1.8

Potassium concentration and uptake in wheat grain and straw

Highest potassium concentration (0.70%) and uptake (33.49 kg/ha) were received in grains of T_6. T_5 (2.0%), T_6 (2.0%) and T_{10} (2.0%) (Table 3) recorded higher potassium concentration in straw and it was significantly superior over all other treatments. Potassium uptake was highest in T_6 (133.74 kg/ha) and it was at par with T_5 (131.20 kg/ha). Lower potassium concentration and uptake was recorded in T_1 (control). Addition of organic matter through different sources resulted in increased potassium concentration, uptake. It

is because of organic sources of nutrients (FYM, wheat straw and green manure) resulted in solubilisation of insoluble phosphates[2] and more availability of plant nutrients.

Table 3: Effect of different treatments on potassium concentration (%) and uptake (kg/ha) in grain and straw of wheat

Treatments	Grain		Straw		Total uptake
	Concentration	Uptake	Concentration	Uptake	
T_1	0.34	4.04	1.7	22.25	26.29
T_2	0.37	13.36	1.7	71.19	84.55
T_3	0.40	18.59	1.8	94.55	113.14
T_4	0.42	19.49	1.8	93.52	113.01
T_5	0.49	26.90	2.0	131.20	158.10
T_6	0.70	33.49	2.0	133.74	167.23
T_7	0.44	22.16	1.9	110.98	133.14
T_8	0.42	21.53	1.9	114.93	136.46
T_9	0.43	20.39	1.8	97.29	117.68
T_{10}	0.47	25.48	2.0	129.00	154.48
T_{11}	0.49	23.27	1.9	103.76	127.03
T_{12}	042	21.36	1.7	101.13	122.49
SEm±	0.02	0.8	0.02	0.8	1.0
CD (P=0.05)	0.05	2.3	0.05	2.2	2.9

CONCLUSION

It can be concluded that integrated use of organic and inorganic nutrient sources enhance the NPK concentration and uptake in grain and straw of wheat.

REFERENCES

1. Kumar, Pawan, Nanwal, R. K. and Yadav, S. K., Integrated nutrient management in pearlmillet (*Pennisetum glaucum*)-wheat (*Triticum aestivum*) cropping system. *Indian J. Agril. Scis*. **75 (10):** 640-643 (2015).
2. Gaur, A. C., Role of phosphate solublising micro-organisms and organic matter in soil productivity. In : *Proc. Sym. on soil productivity, Nat. Acad Sci. India*. Pp.59 (1972).
3. Singh Dashrath and Kumar Anil., Effect of inorganic and organic sources of nutrients on yield and nutrient uptake by wheat and soil fertility, *Annals of Plant and Soil Res*. **17 (2):** 146-149 (2015).
4. Zahir Shah and Mian Ishaq Ahmad, Effect of integrated use of farm yard manure and urea on yield and nitrogen uptake of wheat, *J. Agril. and Biol. Sci*., Vol.1, No.1(2006).