

Effect of Fertilizer Levels and Different Combinations of Biofertilizers on Phosphorus Content & Uptake in 2015-16

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ABSTRACT

A study was conducted during Rabi season 2015-16 at Research Area of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India) situated at 29°10' N latitude and 75° 46' E longitude to notice the effect of fertilizer levels and different combinations of biofertilizers on Phosphorus content & uptake in 2015-16. Experiment was laid out in split plot design having various RDF levels (F1, F2 and F3) and different combinations of biofertilizers (B1, B2, B3, B4, B5, B6 and B7) were used as treatments. Results revealed that P uptake in grain and straw of barley grain showed significant relation with the different fertility levels and different combinations of biofertilizers. Varying fertilizer levels did not have any significant effect on P content in grain and straw of barley. In the year 2015-16 seed inoculation with biofertilizers recorded significantly higher Phosphorus content in grain than B1 treatment. Seed inoculation with B5 produced highest P uptake in grain and straw.

Keywords: Fertilizer levels, Biofertilizers, Treatments, P content and P uptake.

INTRODUCTION

Barley (*Hordeum vulgare*) crop belongs to graminiae family. 100g serving of barley crop provides 352 Calories and also a very rich source of essential nutrients in our daily food which includes the protein, dietary fiber, niacin, B vitamins and vitamin B6 and also several other dietary minerals. Barley contains 78% carbohydrates, 10% protein, 1% fat and also 10% water present in it. Now a days biofertilizers are becoming more and more popular when combined with chemical fertilizers for the reduction of the dose of chemical fertilizers so that the coming negative effect of these fertilizers can be

declined on the soil as well as our environment. Keeping these points under the consideration, present investigation was taken on “Effect of fertilizer levels and different combinations of biofertilizers on Nitrogen content and uptake by grain and straw in 2015-16”.

The field experiment was conducted during the rabi season of 2015-16 replicated three times having the split plot design at Research Area of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India) situated at 29°10' N latitude and 75° 46' E longitude at an elevation of 215.2 m above the mean sealevel.

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Treatments taken in the main plots were fertilizer levels 50 % RDF, 75 % RDF and 100 % RDF and in sub plot were uninoculated, *Azotobacter*, *Azospirillum*, PSB, *biomix* i.e *Azotobacter* +*Azospirillum*+PSB, *Azotobacter* +PSB and *Azospirillum* +PSB in a split plot design.

P content in grain as well as straw at harvest was determined. For analysis of P oven dried plant material (grain as well as straw at harvest) from each plot was grinded separately with the help of grinder. Phosphorus (Vanadomolybdo-phosphoric acid yellow colour method, Jackson 1973) contents in sample were analyzed.

The uptake of nutrient was computed as:

$$\text{grain (kg/ha)} = \frac{\text{Nutrient content in grain (\%)} \times \text{Grain yield (kg/ha)}}{100}$$

$$\text{straw (kg/ha)} = \frac{\text{Nutrient content in straw (\%)} \times \text{Straw yield (kg/ha)}}{100}$$

RESULTS AND DISCUSSION

The data presented in Table 1 showed that P uptake in grain and straw of barley grain showed significant relation with the different fertility levels and different combinations of biofertilizers. Varying fertilizer levels did not

have any significant effect on P content in grain and straw of barley. Among different fertility levels, application of 100% RDF resulted in significantly higher P uptake in grain and straw of barley than rest two treatments (50 and 75 % RDF).

Table 1: Effect of fertilizer levels and different combinations of biofertilizers on phosphorus content and uptake by grain and straw of barley

Treatments	2015-16			
	P content(%)		P uptake (kg/ha)	
	Grain	Straw	Grain	Straw
Fertilizer levels				
50 per cent RDF	0.39	0.22	12.47	12.49
75 per cent RDF	0.41	0.24	14.62	13.55
100 per cent RDF	0.42	0.26	16.71	16.81
SEm±	0.01	0.01	0.60	0.32
CD at 5 %	NS	NS	1.75	0.98
Biofertilizers				
Uninoculated	0.34	0.22	12.50	12.44
Seed inoculation with <i>Azotobacter</i>	0.40	0.24	14.31	13.25
Seed inoculation with <i>Azospirillum</i>	0.41	0.24	14.79	13.69
Seed inoculation with PSB	0.42	0.24	14.88	14.11
Seed inoculation with <i>Biomix</i>	0.42	0.26	15.82	15.98
Seed inoculation with <i>Azotobacter</i> + PSB	0.41	0.25	14.56	15.06
Seed inoculation with <i>Azospirillum</i> + PSB	0.42	0.25	15.36	15.46
SEm±	0.02	0.01	0.54	0.24
CD at 5 %	0.06	NS	1.65	0.78

Seed inoculation with biofertilizers recorded significantly higher P content in grain than uninoculated treatment. Least value for P

content in grain was obtained from uninoculated treatment (0.34%). Seed inoculation with *Biomix* produced maximum P

uptake in grain and straw, followed by seed inoculation with *Azospirillum* +PSB and *Azotobacter* + PSB.

The increase in uptake of nutrient was due to the fact that nutrient uptake followed the yield pattern which increased with increasing level of fertilization. Katiyar and Uttam (2003) reported that the higher fertility levels increased the concentration and uptake of P in grains and straw. Because of application of high level of fertilizers, more nutrients availability might have increased the cation exchange capacity of roots thereby increasing nutrient absorption and cellular contents in the plants (Kumar et al., 2002). Higher nitrogen content in grain might be because of fixed P solubilization due to seed inoculation (Satyajeet et al., 2007 & Nisha et al., 2007). Similar results P uptake was reported by (Ram et al., 2014). Sayed et al. (2000) also reported that *Azospirillum* inoculation alone or in the combination with *phosphate solubilizing bacteria* significantly increased P uptake.

CONCLUSION

Based on one year study, it can be concluded that application of 100 % RDF in barley was found optimum in terms of P uptake by grain and straw. Among different combinations of Biofertilizers, seed inoculation with *Biomix* was found better in respect of P uptake by grain of barley.

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