

## Interactive Effect of Fertilizer Levels and Different Combinations of Biofertilizers on Nitrogen Content and Uptake by Grain and Straw in 2015-16

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### ABSTRACT

The experiment was conducted during Rabi season in 2015-16 at Research Area of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India which is situated at 29°10' N latitude and 75° 46' E longitude which is 215.2 metre above mean sea level to notice the effect of fertilizer levels and different combinations of biofertilizers on N content & uptake. Various RDF levels (50%, 75% and 100%) and different combinations of biofertilizers (uninoculated, Azotobacter, Azospirillum, PSB, biomix, Azotobacter + PSB and Azospirillum +PSB) were used as the treatments. The data recorded indicate that various fertilizer levels significantly influenced the N content and its uptake in grain and N uptake in straw. Increasing levels of fertilizer resulted in significant enhancement in N content and its uptake in grain and also N uptake in straw of barley. Among the seed inoculations with different combinations of biofertilizers, least value for N content in grain was obtained from uninoculated treatment 1.70% in the year 2015-16. Seed inoculation with Biomix recorded highest N uptake in grain as well as straw.

**Keywords:** Fertilizer levels, Biofertilizers, Biomix, Nitrogen content and N uptake.

### INTRODUCTION

Barley (*Hordeum vulgare*) crop belongs to grass family. It is one of the major cereal crop grown in temperate climate worldwide. It is currently used for animal fodder, source of fermentable material for production of beer and various other distilled beverages and also as main component of various health foods. It was one of the first cultivated crops, especially in Eurasia region 10,000 years ago. It is widely used in soups,

also used in barley bread under the various cultures. Barley grains are commonly converted into malt in a traditional method of preparation.

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”.

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The field experiment was conducted during *rabi* season of 2015-16 which was replicated three times having the split plot design at Research Area of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India) which is situated at 29°10' N latitude and 75° 46' E longitude at an elevation of 215.2 m above the mean sea level. Treatments taken as in the main plots were fertilizer levels as 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.

N content in grain as well as straw at harvest was determined. For analysis of N oven dried plant material (grain as well as straw at harvest) from each plot was grinded separately with the help of grinder. Nitrogen (Nessler's reagent method, Lindner 1944) contents in sample were analyzed.

The uptake of nutrient was computed as:

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

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

## RESULTS AND DISCUSSION

The data pertaining to nitrogen content (per cent) and uptake (kg/ha) in grains and straw of barley are presented in Table 1. The data indicate that various fertilizer levels significantly influenced the N content and its uptake in grain and N uptake in straw. Increasing levels of fertilizer resulted in significant increase in N content and its uptake

in grain and N uptake in straw of barley. N uptake in grain as well as in straw was recorded highest with the application of 100 % RDF with N uptake of 70.01 kg/ha in the year 2015-16. Lowest N content in grain was recorded with the application of 50 % RDF. Varying fertilizer levels fail to influence N content in straw of barley.

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

Treatments	2015-16			
	N content(%)		N uptake(kg/ha)	
	Grain	Straw	Grain	Straw
<b>Fertilizer levels</b>				
50 per cent RDF	1.63	0.30	52.11	16.20
75 per cent RDF	1.72	0.32	59.83	18.44
100 per cent RDF	1.82	0.33	70.01	21.52
SEm±	0.02	0.03	2.31	0.71
CD at 5 %	0.06	NS	6.92	2.14
<b>Biofertilizers</b>				
Uninoculated	1.65	0.30	51.98	16.49
Seed inoculation with <i>Azotobacter</i>	1.69	0.31	57.96	17.66
Seed inoculation with <i>Azospirillum</i>	1.72	0.32	61.2	18.04
Seed inoculation with PSB	1.71	0.32	61.66	18.54
Seed inoculation with <i>Biomix</i>	1.77	0.33	66.21	20.80
Seed inoculation with <i>Azotobacter</i> + PSB	1.74	0.32	61.76	19.85
Seed inoculation with <i>Azospirillum</i> + PSB	1.75	0.32	63.82	19.67
SEm±	0.02	0.03	2.91	0.96
CD at 5 %	0.08	NS	8.76	3.01

Among seed inoculation with different combinations of biofertilizers, least value for N content in grain was obtained from uninoculated treatment (1.65% in the year 2015-16). Seed inoculation with *Biomix* produced highest N uptake in grain and straw. Seed inoculation with different combinations of biofertilizers did not have any significant effect on N content in straw of barley. The increase in uptake of nutrient was mainly 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 N in grains and straw. Due to the application of high level of fertilizers, more nutrients availability might have increased the cation exchange capacity of roots thereby increasing the nutrient absorption and cellular contents in plants (Kumar et al., 2002). Woldeyesus et al. (2004), Taalab et al. (2015) and Muurinen (2007) also reported significant increase in straw nitrogen uptake with increased N rates. Reason for higher nitrogen content in grain might be due to more availability of nitrogen and fixed phosphorous solubilization due to seed inoculation (Satyajeet et al., 2007 & Nisha et al., 2007). Higher microbial activities due to seed inoculation with biofertilizers results in release of more nutrient which are easily taken up by the plants and results in higher nutrient content and uptake by grain as well as straw. Similar results N uptake was reported by (Ram et al., 2014).

### CONCLUSION

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

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