

A comparative study on effect of bio-fertilizers on bio-metabolites of barley and fenugreek seeds

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ABSTRACT

A pot culture experiment was conducted to study the effect of bio-fertilizers on bio-metabolites such as total nitrogen, total protein, total soluble carbohydrates and total lipid content of barley and fenugreek seeds. A combined treatment (Azotobacter+ Azospirillum+ Phosphate Solubilizing Bacteria) was found more effective and significant as compared to their respective control and other individual treatments in both crops.

Keywords: *Azospirillum*, *Azotobacter*, PSB, Barley, Bio-fertilizers, *Hordeum vulgare*, *Trigonella foenum graecum* and fenugreek.

INTRODUCTION

In crops, poor development of root system during initial period of establishment is responsible for poor nutrition because of their accessibility to limited soil volume. The situation of poor nutrient could be rectified by adding inorganic and biofertilizers to increase nutrient concentration in the vicinity of root. Application of biofertilizers in recent years have emerged as promising components to nutrient supply system (Pradhan, 1994). Therefore, an attempt has been made to study the various nutrient entities in barley and fenugreek seeds as affected by the treatment of different bio-fertilizers.

MATERIAL AND METHODS

Only 100 gm of soaked fenugreek (*Trigonella foenum graecum*) and barley (*Hordeum vulgare*) seeds were mixed with 1mg/gm of selected bio-fertilizers (manufactured by International Panacea Ltd. New Delhi). Following treatments were allocated to the soaked seeds in triplicate.

- T₀- Uninoculated (control)
- T₁- Treatment with Azotobacter
- T₂- Treatment with Azospirillum
- T₃- Treatment with PSB
- T₄- Combined treatment with all the above three bio-fertilizers.

The seeds were dried in shades and sown in pots having sterilized garden soil. The representative soil samples were analyzed in Regional Soil Testing Laboratory, Bilwa, Bareilly (U.P). The initial characteristics of the experimental soil are as follows- available Nitrogen- 60kg/ha, available Phosphorus-197.50kg/ha, available potassium in kg/ha - very low, organic matter- 0.23 % and pH - 7.36.

Only 10 seeds were sown in each pot and after the emergence of seedlings thinning were done by allowing only 5 plants per pot in fenugreek and 8 barley plants per pot to grow. Seeds obtained after ripening were subjected for chemical analysis. Following methods were employed for analysing chemical parameters.

- Total nitrogen was determined by conventional micro-Kjeldahl method.
- Protein was determined by multiplying N-values with 6.25 (Sadasivam and Manickam, 1992).
- Ether extractable lipid content by Soxhlet extraction procedure using petroleum ether.

RESULTS AND DISCUSSION

The results of bio-metabolites analyzed in the barley and fenugreek seeds obtained from different biofertilizer treatments have been summarized in the Table 1 and 2 respectively. All values were presented in percentage dry matter basis.

Seed Total Nitrogen and Crude Protein content

Total nitrogen as well as crude protein showed similar variation against all treatments in barley seeds. All treatments showed higher results

in comparison to the control however T₁ and T₄ treatments showed significant enhancement.

In fenugreek seeds *Azospirillum* showed significantly higher values (2.998) against its control, and other treatments did not produce desired results. It seems that in fenugreek crop only *Azospirillum* treatment, positively affected nitrogen metabolism. And in barley seeds combined (*Azotobacter* + *Azospirillum* + PSB), as well as *Azotobacter* treatment were effective with respect to their respective controls.

Seed carbohydrate content

In barley seeds *Azospirillum* treatment proved to be effective and significant at 5 %critical level as compared to control. However in fenugreek seeds no such results were obtained from any treatments. These results stand corroborated by the findings of Baktash *et al.* (2003).

Table 1: Effect of different biofertilizers on various bio-metabolites of barley seeds

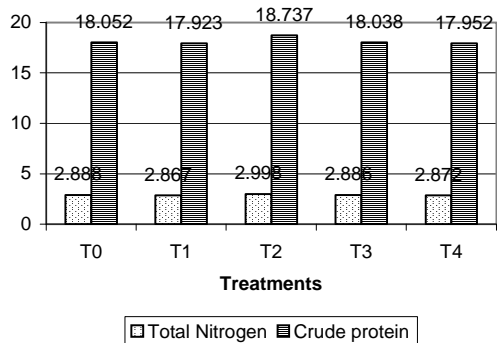
Treatment	Total Nitrogen	Crude Protein	Total Carbohydrate	Total Lipid
T ₀	1.526	9.512	86.532	1.838
T ₁	1.658**	10.362**	87.328	1.668
T ₂	1.529	9.454	86.987**	1.471
T ₃	1.532	9.079	86.904**	2.443**
T ₄	1.663**	10.393**	86.864	1.521
CD at 5% (P=0.05)	0.1244	3.6605	1.0076	N.S

Table 2: Effect of different biofertilizers on various bio-metabolites of fenugreek seeds

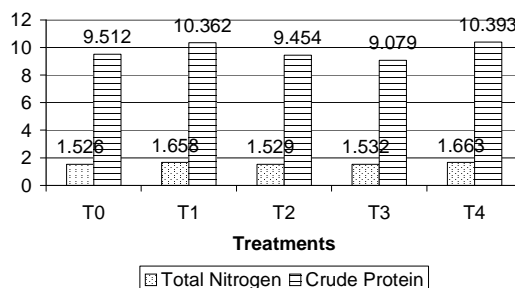
Treatment	Total Nitrogen	Crude protein	Total carbohydrate	Total lipid
T ₀	2.888	18.052	74.210	3.200
T ₁	2.867	17.923	74.620	3.224
T ₂	2.998**	18.737**	74.289	3.628**
T ₃	2.886	18.038	74.518	3.153
T ₄	2.872	17.952	73.495	3.826**
CD at 5% (P=0.05)	0.085	0.535	NS	0.411

*Values in mg/100gm; remaining parameters values in percentage on dry matter basis.

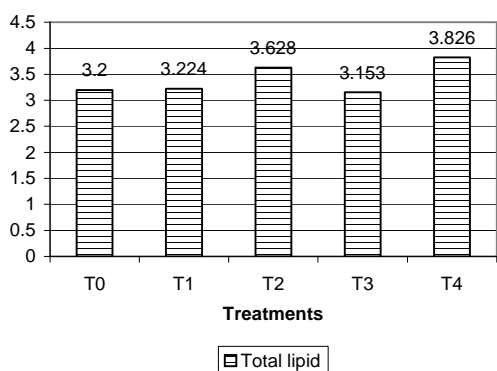
**Significant values



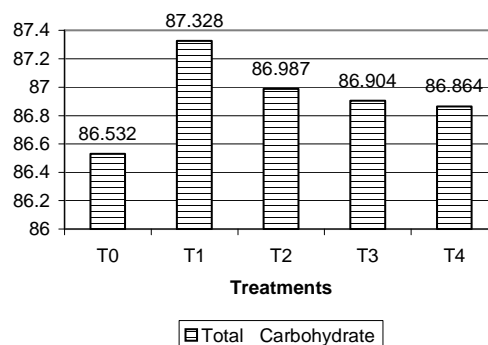
Total Nitrogen/Crude Protein content of fenugreek seeds



Total nitrogen /Crude Protein content of Barley seeds



Total lipid content of Fenugreek seeds



Total Carbohydrate content of Barley seeds

Fig. 1: A comparative study on effect of bio-fertilizers on bio-metabolites of barley and fenugreek seeds.

Seed lipid content

In barley seeds PSB treatment provided significantly higher values (2.443 mg/100gm) as compared to control. This is in accordance with the observation made by Kumar et al. (2003) on soybean. In fenugreek seeds Azospirillum and combined treatment proved to be more effective and significant as compared to control. These results are in close conformity with the findings of Lanje et al. (2004).

It is evident from the foregoing discussion that the selected biofertilizers produce highly specific

and positive results in different chemical entities of barley and fenugreek seeds.

Therefore, it can be concluded from these pot trial that the inoculation of seeds by specific biofertilizer in selected crops proves beneficial to both crops in different ways by enhancing the nutritive values of edible crop seeds. Hence a judicious use of biofertilizers is recommended to increase the yield and nutritive value of barley and fenugreek crop seeds.

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