

## THE EFFECT OF DIAZOTROPHS ON GRAIN YIELD OF SPRING WHEAT

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**ABSTRACT.** Three cultivars of spring wheat (KG1103, KG1203 and KG1303) were inoculated with seven different strains of diazotrophs (Dd1, Dd2, Dd3, Dd4, Dd5, Dd6 and Dd7) and mixed population (Dd9). Influence of inoculation was analyzed on the some components of grain yield and grain yield. Influence on inoculation with diazotrophs indicated very significant differences in majority investigation parameters. The highest grain yield was found in cultivar KG1303. The highest effect of inoculation with diazotrophs has got with strain Dd1 and association between Dd1 and KG1103 was most effective. However, in the case interaction genotyp-strain, association KG1303 and Dd1 showed the highest values.

### INTRODUCTION

Wheat (*Triticum aestivum* L.) is one of the most important plant species. Wheat needs optimal environmental conditions for high yield and good grain quality (ZEČEVIĆ *et al.*, 2004a). One of the most important element which is necessary for organic matter synthesis in wheat is nitrogen. If wheat, as a non legume plant species, could fix nitrogen, it will be make possibility from unlimited source of this element from air, make accessible nitrogen form in soil and make possible that its alone provide nitrogen nutrition (MIĆANOVIĆ, 1997).

The greatest progress in practical application of nitrogen fixators was achieved in symbiotic nitrogen fixation with leguminous plants, but application of free nitrogen fixators is still under investigation. Process of creation of effective association of wheat genotype and diazotrophs strain characterizes a lot of fundamental ignorance and each new knowledge in this investigation represents a contribution to future investigation (DOBEREINER *et al.*, 1987). Application of new methods in selection as is nodulation of wheat (BIABANI *et al.*, 2003), transfer gene to the crop plants (KNEŽEVIĆ *et al.*, 2001), using higher number of investigation genotypes and strain of diazotrophs (TEVRICAN *et al.*, 2004), were possible ways for obtaining more liable results in future.

### MATERIAL AND METHODS

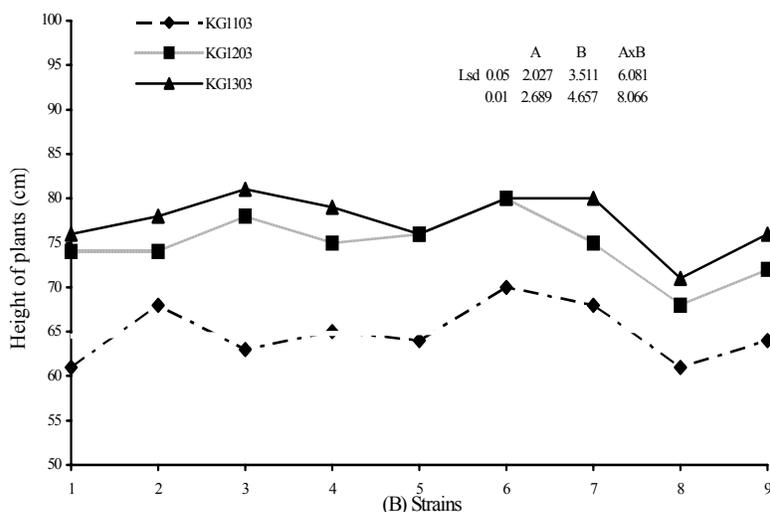
The experiment were carried out in Center for small grains from the experimental field, in 2003. On the vertisol type of soil three different genotypes of spring wheat (KG1103, KG1203 and KG1303) were used in this investigation. Seven strains of diazotroph determined such nif bacteria with nif PCR (Dd1, Dd2, Dd3, Dd4, Dd5, Dd6, and Dd7) and their combinations as mixed populations (Dd9) were chosen in this research. The seeds of genotypes was inoculated before seeding with 200 $\mu$ l per seed ( $10^8$  cell ml $^{-1}$ ) in rows (1.5 m) with hands. The control variant was not inoculated (Dd8).

Influence of inoculation was analyzed on the some components of grain yield and grain yield at the end of vegetation period.

## RESULTS AND DISCUSSION

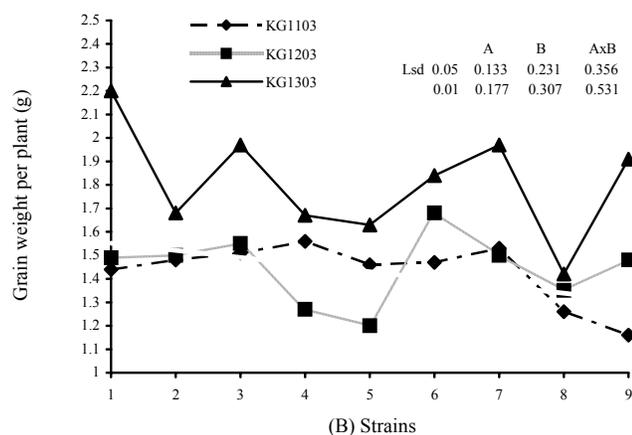
Diazotrophs have influence to morphophysiological traits, biomass, and content of nitrogen in host plant and grain yield (SARIĆ *et al.*, 1990). Plant height is most important components of the grain yield and its increasing it directly influences on the grain yield (ZEČEVIĆ *et al.*, 2004b).

Results of this investigation point out that the plant height depended of investigated genotypes and strain of diazotrophs. The highest plant height was in genotype KG1303 (77.53 cm) and the smallest in genotype KG1103 (64.97 cm). Difference in plant height between that was statistical very significant. In our investigation the most effective bacteria strains used were Dd6 (75.33 cm), Dd7 (74.50 cm) and Dd3 (73.67 cm). Differences between that was not significant. The shortest plants were in control variants Dd8 (66.58 cm) and difference between control variant and variants inoculated with strains Dd6, Dd7 and Dd3 were statistical very significant. Interaction between KG1303 and Dd3 (80.50 cm) was most effective, Graph. 1.



Graph. 1. The effect of inoculation on height of plants (cm) in investigated genotypes of wheat (A)

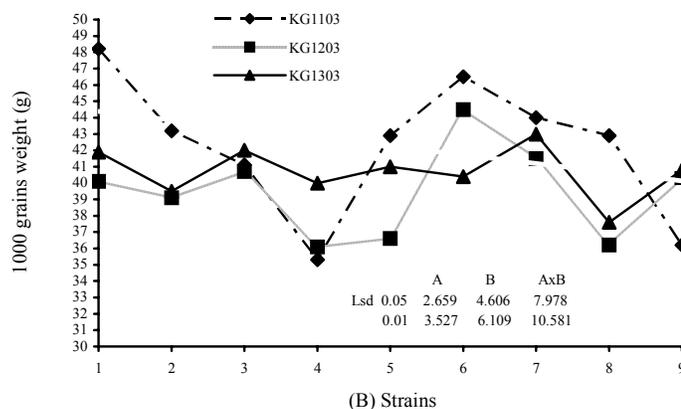
Grain yield is the most important characteristics of wheat cultivar. Nitrogen has positive influence on increasing of grain yield (KNEŽEVIĆ, *et al.*, 2000), and application of this results very important from economical and ecological aspects (MIĆANOVIĆ *et al.*, 2004). The grain weight plant $^{-1}$  of investigation genotypes depended on the characteristics of cultivar and bacterial strain. The highest grain weight plant $^{-1}$  was in genotype KG1303 (1.85 g).



Graph. 2. The effect of inoculation on grain weight plant<sup>-1</sup> (g) of investigation genotypes of wheat (A)

The smallest grain weight plant<sup>-1</sup> was in genotype KG1103 (1.43 g). Differences between that was statistical very significant (Graph. 2). The greatest inoculation effect was obtained with bacteria strains Dd1 (1.71 g), Dd3 (1.68 g) and Dd7 (1.67 g). The smallest grain weight plant<sup>-1</sup> was in control variant Dd8 (1.42 g) and differences between control variant and variants inoculated with strains Dd1, Dd3 and Dd7 were statistical very significant. Association between Dd1 and KG-1303 was the most effective (2.20 g).

The 1000 grains weight of investigation genotypes depended on the characteristics of cultivar. The 1000 grains weight and grain weight plant<sup>-1</sup> has highly significant, and have positive genetic and phenotypic correlation ( $r_g=0.561^{**}$ ;  $r_p=0.445^*$ ), ZEČEVIĆ *et. al.*, 2004a. The highest 1000 grains weight was in genotype KG-1103 (43.53 g). The lowest 1000 grains weight was in genotype KG1303 (39.64 g). Differences between that were statistical very significant (Graph. 3). The greatest inoculation effect was obtained with bacteria strains Dd6 (43.83 g), Dd1 (43.42 g) and Dd7 (42.84 g). The lowest 1000 grains weight was in control variant Dd8 (38.91 g). The 1000 grains weight did not significant differed under inoculation. Association between Dd1 and KG1103 was the most effective (48.22 g).



Graph. 3. The effect of inoculation on the 1000 grains weight (g) of investigation genotypes of wheat (A)

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