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Title

Responses of Some Dwarf Bean (*Phaseolus vulgaris* L.) Genotypes Grown in Turkey to
Zinc and Boron Applications

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Introduction

Malnutrition is a common problem in the world, effecting about one billion people while more than 2 billion people suffer from microelement deficiencies (zinc, iron, selenium, boron etc.), referred to as “occult hunger”. These deficiencies may be alievated by selecting and growing crop plant genotypes that better benefit from improper growing conditions. In this study, different boron and zinc concentrations were applied and the reactions of 25 registered and local populations of dwarf bean genotypes, grown extensively in Turkey, were determined.

Materials and Methods

Materials used in the study were supplied by the Scientific Research Institutes in Turkey. Trial was conducted within glasshouse and the soil used was poor in microelements and organic material composition. Its pH was neutral and there was no salinity problem. According to randomized plots factorial design, the trial was conducted in 3 replicates, with 0, 5 and 10 mg kg⁻¹ boron and zinc doses that were applied in the form of boric acid (H₃BO₃) and zinc sulfate (ZnSO₄.7H₂O), accordingly.

Results and Discussion

Responses of dwarf bean genotypes used in the trial were genotype dependent. The highest biomass and dry weight values were obtained from the control boron doses (B₀) of Eskisehir-855 Sehirali-90, Göynük-98, Karacasehir-90, Akdag, Noyanbey, Terzibaba, Yakutiye, Sahin-90, Fasulye sira, Yalova-17, Romano, Nazende, Seminis Gina and Kanada genotypes, and from 5 mg kg⁻¹ boron doses of the genotypes Yunus-90, Akman-98, Önceler-98, Aras-98, Horoz fasulye, Zülbiye, Sarikiz, Magnum, May Gina and Efsane, while at 10 mg kg⁻¹ boron doses, biomass and dry weight values of all the genotypes used were decreased considerably (Figure 1).

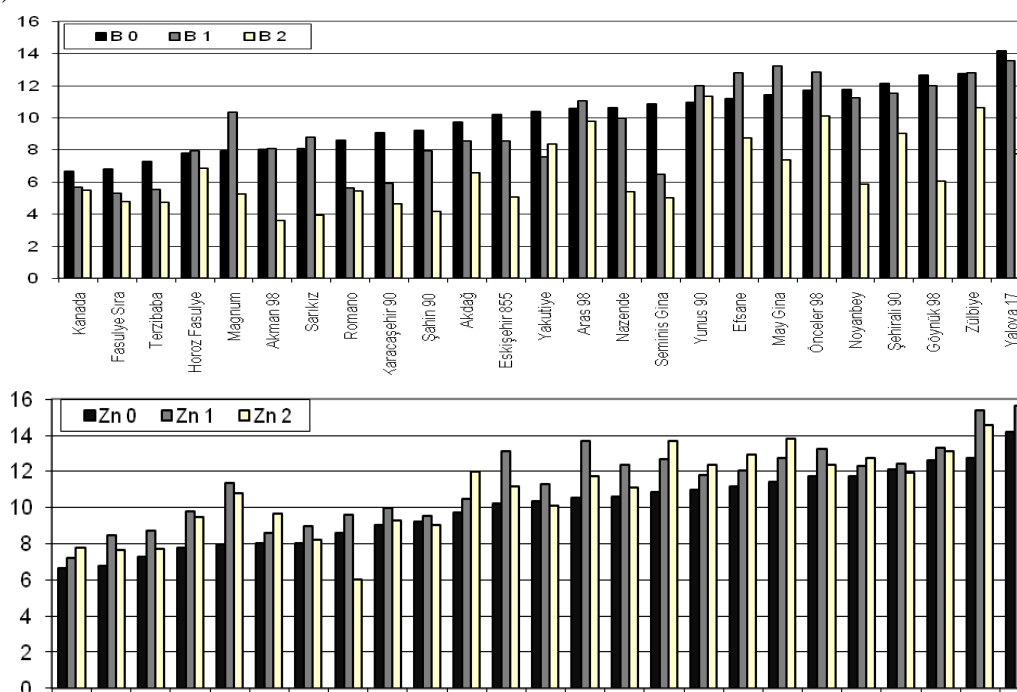


Figure 1. Effects of boron and zinc application on biomass (g plant⁻¹) of dwarf bean genotypes

When responses of bean genotypes to zinc doses were tested, the highest grain yield was at control dose (Zn_0) for the genotypes Akman-98, Karacasehir-90, Noyanbey, Terzibaba, Sahin-90, Horoz fasulye, Nazende and Efsane; was 5 mg kg^{-1} zinc (Zn_1) dose for the genotypes Eskisehir-855, Sehirali-90, Yunus-90, Önceler-98, Zülbiye, Yakutiye, Romano and Kanada; and was 10 mg kg^{-1} at zinc (Zn_2) dose for the genotypes Akdag, Sarikiz, Magnum, Seminis Gina, May Gina and Yalova-17. We can remark that the genotypes Akman-98, Karacasehir-90, Noyanbey, Terzibaba, Sahin-90, Horoz fasulye, Nazende and Efsane were tolerant, that the genotypes Göynük-98, Aras-98 and Fasulye sira were semi-tolerant, that the genotypes Eskisehir-855, Yunus-90, Sehirali-90, Önceler-98, Zülbiye, Yakutiye, Romano and Kanada were semi-sensitive, and that the genotypes Akdag, Sarikiz, Magnum, Seminis Gina, May Gina ve Yalova-17 were very sensitive to zinc deficiency.

Depending on the increase in the level of boron application, there was a significant decrease in dry weight values of bean genotypes, while the progress may be impeded by zinc application (Figure 2).

In B x Zn interaction, the highest plant grain yield was 1.64 g, obtained from $B_1 \times Zn_1$ application. On the other hand, the lowest grain yield was 1.37 g, obtained from $B_2 \times Zn_0$ application (Figure 2).

In our study, boron x zinc and boron x zinc x genotype interactions in terms of biomass, dry weight, and grain yields obtained from dwarf bean genotypes were of considerable importance, suggesting that the effects of boron and zinc applications on the yield values were changed, depending on both the applications and the genotypes used.

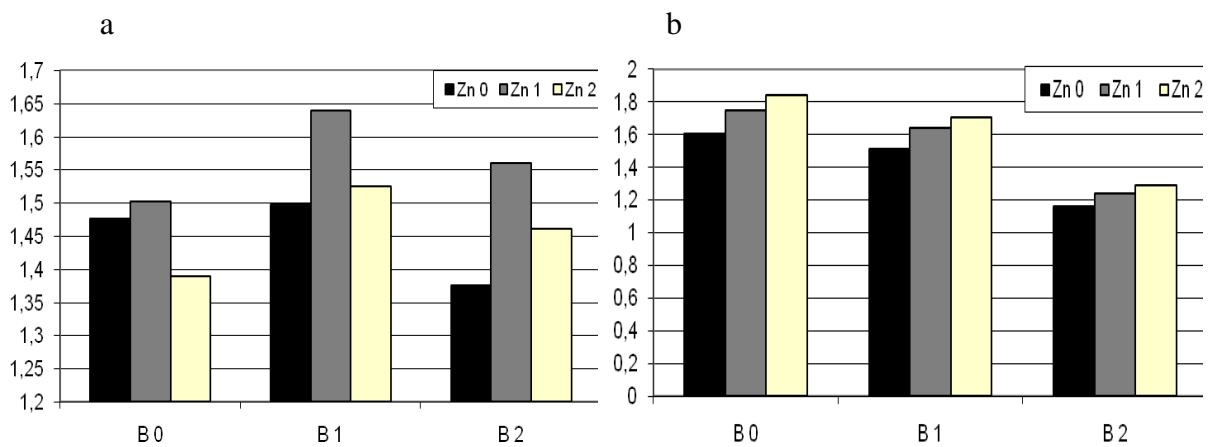


Figure 2. Effects of boron and zinc application on dry weight (a) and grain yield (g plant⁻¹) of dwarf bean genotypes