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Effects of salt stress on germination, seedling growth, and macro element content of barley (*Hordeum vulgare* L.) varieties*

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Abstract

Barley (*Hordeum vulgare* L.) is an important cereal crop grown worldwide, but it is highly susceptible to salinity stress during early developmental stages. This study aimed to investigate the effects of salinity stress on four barley cultivars commonly grown in Turkey (Aydanhanım, Baronesse) and Bulgaria (Zemela, Bojin) at critical stages of germination and seedling growth. The experiment was conducted in a randomized block design with four replications, and salt treatments (NaCl) were applied as a solution. Two different concentrations of sodium chloride (NaCl) were used: 0 (Control), 100, and 200 mM. Germination, seedling characteristics, and the content of macrolelements (P, K, Mg, Na, and Ca) were assessed. Salinity stress significantly reduced key growth parameters such as the root length, shoot length, plant height (root+shoot), fresh weight, dry weight, germination capacity (GC), initial vigor (IV), and germination index (GI). Genotypic differences were observed among the cultivars for all the evaluated features. As the salinity stress increased, the content of P, K, Mg, and Ca decreased in all the cultivars, while the Na content increased. Aydanhanım and Baronesse were the least affected, whereas Zemela and Bojin were the most affected by the increasing salt doses (100, 200 mM). At the largest salinity level (200 mM NaCl), the germination capacity of Zemela and Bojin was significantly reduced, while Aydanhanım and Baronesse showed improved germination capacity compared to the control and 100 mM salt dose treatments.

Keywords: two-row barley, germination index, initial vigor, mineral composition, stress index, toxic effect, salinity