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Changes in growth characteristics and physiological indices in Zn-Stressed *Phaseolus vulgaris* plants on hydroponic medium

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Abstract

Zinc is one of the essential micronutrients for the normal growth and development of plants, as it is known to be required in several metabolic processes but the presence of Zinc at higher concentrations especiallyinacid soils, is limiting factor for plant growth. To evaluate the impact of Zinc on growth and physiological characteristics of bean plants, concentrations of 30, 40 and 50 (µM) $Zn(No3)_2$ were used in the hydroponic media.The results showed that the treatments had significant effects on the growth and physiological parameters so that the rate of germination, root length, shoot length, leaf area, fresh weight, dry weight, SLW and LWR significantly decreased and LAR and LWCA significantly increased with increasing of Zn concentration and also Zn had no significant effect on SLA on the plants. According to the Duncan analysis, presence of Zn in the nutrient medium caused to increase chlorophyll content and soluble sugars significantly butinsoluble sugars exhibited decreasing.The presence of heavy metals in the rhizosphere and influx them to plant make reduce growth and cause to irregularity in cells metabolism,thus Zn might be affected the important processes such as water transporting, mitochondrial oxidative phosphorylation, photosynthesis and chlorophyll content.

Keywords: Growth, *Phaseolus vulgaris*, Physiological indices, Zn