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Foliar Application of Zinc Oxide on Yield of Cowpea under Cutting of Irrigation Conditions

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Abstract

Drought stress is one of the most adverse factors of plants growth and productivity. Proper nutrition availability under stress conditions could partly help the plant to tolerate different stresses. Zinc plays a key role in the synthesis of proteins, DNA, and RNA. In order to investigate effect of foliar application of Zinc oxide in common and nanoparticles form on yield and yield components of cowpea (*Vigna sinensis* L.) under drought stress conditions, an experiment was carried out as a split plot complete randomised block design with three replications in a field located in Shooshtar city in Iran, during the growing season of 2014–2015. Water stress at three levels (control, cutting of irrigation at 50% flowering, and cutting at 50% pod setting stages) were assigned as main plots and zinc oxide foliar application at five levels (control, 5 and 10 g l⁻¹ nano sized zinc oxide, and 5 and 10 g l⁻¹ non-nano-scale zinc oxide) were randomised in sub-plots. The results suggested that the drought stress at flowering and podding stages decreased the 100-seed weight by 36% and 21% in comparison to control treatment, respectively. The maximum effects of Zinc on increasing traits was found by foliar application of 10 g l⁻¹ nano zinc oxide, 10 g l⁻¹ zinc oxide, 5 g l⁻¹ nano zinc oxide and 5 g l⁻¹ zinc oxide, respectively. The results showed that foliar application of 10 g l⁻¹ nano zinc oxide in the control and for the drought stress at flowering and podding stage treatments, increased the grain yield by 64%, 57% and 37% in comparison to the control without foliar application, respectively. Positive effects of application of nano-scale zinc oxide particles on yield and yield components of cowpea was higher as those of micro-particles zinc oxide, and can reduce stress effects.

Keywords: 100-seed weight, legume, nano particles, water deficit stress