**Fifth Article: (Sharing with another inside and outside the specialization-Published).**

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| **Article title** | Synergistic effects of zinc oxide nanoparticles and moringa leaf extracts on drought tolerance and productivity of *Cucurbita pepo* L. under saline conditions. |
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## Abstract

This study investigated the combined effects of zinc oxide nanoparticles (Nano-Zn) and moringa leaf extract (MLE) on squash plants grown under water stress conditions in saline soil during 2021–2022. The research compared full irrigation (100% ETc) with water deficit conditions (60% ETc). While water deficit negatively impacted plant growth, yield, and various physiological parameters, the sequential application of Nano-Zn (at 50 or 100 mg $L^{-1}$ ) with MLE (3%) significantly mitigated these adverse effects. The combined treatment proved more effective than individual applications, enhancing growth parameters, photosynthetic efficiency, and antioxidant systems. The treatment particularly improved stress tolerance by increasing protective compounds like soluble sugars and amino acids while reducing harmful $H_2O_2$ levels. The study concluded that sequential application of 100 mg $L^{-1}$ Nano-Zn with MLE was optimal for enhancing squash performance under drought stress, with 50 mg $L^{-1}$ Nano-Zn plus MLE as the second-best option.