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**SALT TOLERANCE AND PRODUCTIVITY OF  
BARLEY (*Hordeum vulgare* L.) AND  
GRAIN SORGHUM (*Sorghum  
bicolor* L.) PLANTS IN  
SANDY SOIL**

By

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B.Sc. Agric. Sc. (Horticulture), Fac. Agric. Ain Shams University, 2014

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## ABSTRACT

**Montaser Hassan Mohamed Youssef: Salt Tolerance and Productivity of Barley (*Hordeum vulgare* L.) and Grain Sorghum (*Sorghum bicolor* L.) Plant in Sandy Soil. Unpublished M.Sc. Thesis, Department of Botany, Faculty of Agriculture, Ain Shams University, 2021.**

This study was carried out to investigate the influence of potassium silicate on the growth and yield of great millet (*Sorghum bicolor* L. Moench cv. Dorado) plants and barley (*Hordeum vulgare* L. cv. Giza 123) plants grown under salinity stress in the two successive seasons of 2018 and 2019 in the Faculty of Agriculture, Ain Shams University, Qalyubia Governorate, Egypt. Four concentrations of salinity at 0, 50, 100 and 150 mM of NaCl were used. Pure sodium chloride was dissolved in tap water to prepare the concentrations. Three concentrations of foliar sprayings of potassium silicate were used at 0, 1 and 2 mM. Results revealed that saline water irrigation decreased vegetative growth, flowering parameters, chlorophyll a and b, relative water content (RWC) percentage. As the salinity concentration increased, the osmolytes content, H<sub>2</sub>O<sub>2</sub> and antioxidant enzymes, i.e. APX, CAT and POX were increased. Concerning the minerals content, increasing the salinity level decreased in K and Si percentages, however, Na percentage was increased in both seasons at great millet and barley plants. With respect for yield attributes, increasing the salinity concentration decreased the yield attributes, i.e. grain yield/plant, panicle weight and spike weight for great millet and barley plants.

The application of potassium silicate alleviates the negative effects of salinity on plants. Under each salinity concentration, the application of potassium silicate at 1 and 2 mM enhanced the vegetative growth parameters, chlorophyll pigments, RWC percentage, the concentrations of proline, sugars and antioxidant capacity in term of scavenging ROS by DPPH (antioxidant activity) and the antioxidant

enzymes, i.e. APX, CAT and POX as compared to control treatments. In addition, potassium silicate significantly diminished the concentration of  $H_2O_2$  to the minimum levels compared to untreated plants of great millet and barley. Also, the application of potassium silicate at 1 and 2 mM under each salinity concentration significantly increased the grain yield/plant, panicle weight and spike weight for great millet and barley plants.

Generally, spraying potassium silicate at 1 or 2 mM with all the salinity concentrations enhanced the grain yield/plant at grain sorghum and barley plants as compared to control treatments.

**Keywords:** Barley, Grain sorghum,  $K_2O_3Si$ , Salinity, NaCl, Antioxidant capacity and Enzymes activity

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