

α -TOCOPHEROL FOLIAR APPLICATION CAN ALLEVIATE THE ADVERSE EFFECT OF SALINITY STRESS ON WHEAT PLANT, *TRITICUM AESTIVUM* L.

Inas Haseeb Khamees AL-Kareemawi and Amel Ghanim Muhmood AL-Kazzaz

Department of Biology, College of Education for Pure Science, Ibn-AL-Haithum, University of Baghdad, Iraq.

e-mail: estabraq_alqaissi@yahoo.com

(Received 12 February 2019, Revised 23 March 2019, Accepted 8 May 2019)

ABSTRACT : Pots experiment was conducted at the greenhouse of botanical garden belong to Department of Biology, College of Education for Pure Science, Ibn-AL-Haithum, University of Baghdad, for growth season 2018-2019. The aim of the experiment was to study the effects of foliar application of α -tocopherol concentrations (0, 50, 100, 150, 200 mg.L⁻¹) on growth parameters and the activity of some antioxidant enzymes of wheat plant irrigated with sodium chloride concentrations (0, 75, 150, 225) mM.L⁻¹. Salinity reduced plant growth parameter, plant height, flag leaf area, flag leaf chlorophyll content and increased the activity of antioxidant enzymes, superoxide dismutase and peroxidase. Plant growth parameters were enhanced by foliar application of α -tocopherol for the interaction between the two factors, the best values for plant height and flag leaf area under the effect of concentration 150mg.L⁻¹ α -tocopherol and concentration 225 mM.L⁻¹ sodium chloride. There was different founds for flag leaf chlorophyll content, which α -tocopherol at concentration 200 mg.L⁻¹ and the concentration 225mM.L⁻¹ sodium chloride gave the best values for the parameter, there was no significant difference between the values of flag leaf chlorophyll content at the concentrations 150, 200 mg.L⁻¹ α -tocopherol under the same concentration of sodium chloride. Antioxidant enzymes were increased by α -tocopherol foliar spraying, the best value for superoxide dismutase activity at height concentration 225 mM.L⁻¹ sodium chloride and 150 mg.L⁻¹ α -tocopherol, the best value for peroxidase activity at concentration 225 mM.L⁻¹ sodium chloride and 100 mg.L⁻¹ α -tocopherol.

Key words : Wheat plant, salinity stress, oxidative stress, antioxidant enzymes, α -tocopherol.

INTRODUCTION

Wheat is major food crop all over the world and different hard stress reduces its yield, wheat provides 55% of carbohydrates and 22% of food calories consumed globally (Hasanuzzaman *et al*, 2017). Salinity stress is the most limiting crop yield, plants under salt stress are subjected to three kind of stress including water deficit caused by osmotic unbalance, ion toxicity due to accumulation of adverse ions and nutritional alternations caused by unbalance in ion transport system (Miller *et al*, 2010). Excessive soil salinity cause accumulation of sodium in wheat leaves and reduce the growth due to the harmful effect and low water availability (Pervize *et al*, 2002). Salinity affect photosynthesis and ion distribution so it cause reduction in plant height, dry weight and leaf area (Al-Saidi and Al-Kazzaz, 2013). Salinity stress trigger oxidative stress in plant tissue, causing to accumulation of reactive oxygen species (ROS) which are harmful and very reactive in nature because they can interact with a number of other molecules and metabolites such as DNA, pigments, proteins, lipids, convert membrane properties such as fluidity and lead

to cell death (Sharma *et al*, 2012). Plants have developed detoxification mechanisms including the synthesis of antioxidant molecules such as tocopherol and ascorbic acid and various antioxidative enzymes such as superoxide dismutase, peroxidase and catalase (Ahmad *et al*, 2010). α -tocopherol known as vitamin E are lipid soluble antioxidants, its synthesized by plants and photosynthetic organisms, it can accumulate in plant leave in response to a biotic stress (Mene-saffrane and Della Penna, 2010). α -Tocopherol have number of functions in plants, the most prominent one is protection of chloroplast membrane polyunsaturated fatty acid from lipid peroxidation (Colombo, 2010). α -Tocopherol quench¹O₂ in photosynthetic membrane organelles and limit lipid peroxidation by reducing lipid peroxy radicals to hydroperoxides (Munne-Bosch, 2007). In the study of (Farouk, 2011) mentioned that salinity increased the senescence of wheat leaves, decreased the concentrations of chlorophyll, potassium, K⁺/Na⁺ ratio and soluble proteins and increased sodium, chloride content in plant tissue, application α -tocopherol reduced sodium and chloride content, increased potassium content,