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Growth response, yield, and quality of bread wheat, *Triticum aestivum* L. For spraying with ascorbic acid and tocopherol

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Abstract: A field experiment was carried out at the Agricultural Research and Experiment Station affiliated with the College of Agriculture - University of Basra during the winter of 2021-2022. To study the response of growth and yield of bread wheat to spraying with ascorbic acid and tocopherol. The study included spraying four concentrations of ascorbic acid 0.150. 300. 450 mg l^{-1} was given the codes A0, A1, A2, A3, and four concentrations of tocopherol acid were sprayed, which are 0. 100. 200. 300 mg l^{-1} has been given the symbols T0, T1, T2, T3. The experiment was applied according to a randomized complete block design (R.C.B.D) using a factorial experiment method with three replications, where wheat seeds (Bohooth-22) were sown on 15.11.2021 at a seeding rate of 140 kg ha^{-1}. The harvest took place on 15.04.2022. The results of the statistical analysis showed the significant superiority of spray concentrations with ascorbic acid at a concentration of 300 mg l^{-1} in terms of yield and quality, as it recorded the highest average for total chlorophyll, percentage of protein in grains, percentage of wet gluten and vitamin C, which amounted to 262.4 mg m^2, 13.79, 34.41%, and 111.6%. As for the biological yield, it recorded the highest average when concentrated at 450 mg l^{-1}, amounting to 13.16 Meg ha-^{1}. As the results showed that spraying with tocopherol acid at a concentration of 200 mg l^{-1} led to a significant increase in the average percentage of protein in grains and the proportion of wet gluten, which amounted to 13.29% or 34.50%, while the concentration was 100 mg l^{-1}, had the highest mean of vitamin C reaching 107.5%. The effective interaction between ascorbic acid and tocopherol significantly affected some growth, yield, and quality traits as it was given at a concentration of 450 mg l^{-1} of ascorbic with a concentration of mg l^{-1} of tocopherol had the highest mean of vitamin C reaching 118.5 mg l^{-1}.

Introduction

Wheat crop (*Triticum aestivum* L.) belongs to the Poaceae family. It is one of the important grain crops and is considered one of the most important crops at the global level, as it ranks first in the ranks of food crops, followed by yellow corn and rice. It occupies more than half of the cultivated lands, and more than two-thirds of the population depends on it for living in the world; in Iraq, the wheat crop is one of the most important winter crops, as its cultivation is widespread in the northern, central, and southern regions. It is considered the main food for most of the population of Iraq, as it is a major source of carbohydrates because it contains a high percentage of starch. The crop also contains a good percentage of protein, cellulose, and fat. It also contains some mineral elements (Qasim et al., 2019).

Despite the increased demand for the wheat crop due to the increase in the population, and wheat is used in many foods and pastry industries, local production began to shrink and decline due to various environmental stresses such as water stress, salt stress, and oxidative stress, although Iraq is one of the original countries. Due to the emergence of wheat and the availability of factors for the success of cultivation of this crop, productivity is still low compared to global productivity, reaching 3.48 Meg ha^{-1} (USDA, 2020), while in Iraq, it amounted to 2.74 Meg ha^{-1} (Central Organization for Statistics and Technology Information 2019).

Ascorbic acid is one of the antioxidants that reduce environmental stress and increase plant tolerance to salinity, drought, and cold, which effectively affects the functional and structural fields in the plant (Helal et al., 2005) and protects the plant from photo-oxidation and its participation in the construction of ethylene, gibberellins, and anthocyanins. Moreover, because of the role that ascorbic acid can play in increasing the efficiency of the photosynthesis process and reducing respiration, its effective role in protecting chloroplasts, and its effective role in resisting free radicals ROS, especially H2O2, which are produced during the process of carbohydrate metabolism, Cell structure and its ability to expand and delay the onset of aging (Barth Conklin, 2006). The use of acid has increased spraying on the vegetative system of plants because it is an antioxidant that encourages the vegetative and fruitful growth of different plants, in addition