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Evaluation of the performance of four genotypes of wheat (*Triticum estivum* L.) under the effect of nitrogen fertilization at two locations in southern of Iraq

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Abstract

The field experiment was conducted in the winter season of 2019-2020 to evaluate the performance of wheat varieties (Bengal, Basra, Dujat alkhayr, and Adana) under the effect of four nitrogen rates (0, 80, 160, 240 and 320 kg N ha⁻¹). At the two locations, one is clay soil in the Al-Qurna, and the other is in the Al-Zubair district, a sandy loam winced by well water. The experiment used split plots in R.C.B.D. design with three replicates; cultivars were added to the subplots while nitrogen fertilizers were added to the main plots. The results indicated significant differences among wheat varieties at the two locations for all parameters studied. Adana variety is the highest value of most studied traits. In addition, nitrogen concentrations had significant effects on all characteristics studied. In the Al-Zubair location, it was found that applying N up to 240 kg N ha⁻¹ significantly increased grain yield. In comparison, Al-Hantha location achieved the highest grain yield at 160 kg N ha⁻¹. Al-Qurna location achieved the highest grain yield of 4.538 tone ha⁻¹ through an interaction between Adana and 160 kg N ha⁻¹. Hence, it may be concluded from this study that this interaction might be indicated for suitable wheat production under environmental conditions.

Keywords: Wheat cultivars, level of nitrogen, location

Introduction

In many parts of the world, winter wheat is the major grain crop, which provides reliable nutrition for people in both rural and urban areas and an important supply of straw for livestock to consume. According to the United States Department of Agriculture (USDA, 2022), wheat produced globally was 778.52 million tons, with a production rate of 3.53 tons ha⁻¹. While production in Iraq reached 4234 thousand tons, with a production rate of 1.789 tons ha⁻¹ for the 2020/2021 season (Directorate of Agricultural Statistics, 2021), to successfully cultivate new varieties and determine which of these varieties is optimal in terms of suitability for various environments, they must be environmentally normal and stable in terms of growth characteristics and yield across environments and seasons. (Tseriov *et al.*, 2023)^[1]. Finding suitable varieties for the region in which the wheat crop is grown is essential for cultivating this crop and achieving a quantitative and qualitative improvement in its production. It is important to understand the suitability of these wheat varieties to the climate in South Iraq, given the extensive work that many research institutions have put into developing new wheat varieties through breeding and enhancement efforts and putting them through multiple tests due to its hot climate and irrigation water with a salinity level that is higher than what is permitted for agriculture. This region has different environmental and soil characteristics than the rest of Iraq. Nitrogen is the primary nutrient that limits the growth of durum wheat. Yield, according to Belete *et al.*, (2018)^[2], nitrogen shortages can have a significant role in determining grain yield in rainfed environments. The development of varieties of wheat with high nitrogen utilization efficiency will assist farmers economically and contribute to a decrease in the environmental damage caused by the excessive application of nitrogen fertilizers (Soofizade *et al.*, 2023)^[3]. Wheat breeders recognize the need to increase yield potential while reducing the environmental impact of fertilizers by creating N-efficient genotypes. The objective of the current study was to investigate the response of four wheat varieties to the addition of four rates of nitrogen in two locations in the south of Iraq.

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