



Estimation of Some Genetic Parameters of Different Genotypes of Maize Crop (*Zea mays* L.) under the Influence of Phosphate Fertilization

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ABSTRACT

Background: Maize crop is an important field crop, but its productivity is affected by the genetic factor (Genotypes) and the differences between them and their response to phosphate fertilization levels. Adding phosphate fertilizer contributes to improving growth efficiency and production, which necessitates conducting a genetic evaluation of Maize Genotypes under phosphate fertilization conditions.

Methods: Field experiment was carried out in the fall of 2023 in the Shatt Al-Arab district (Al-Hawta) in the east of Basrah Governorate in soil with a clay texture, in order to estimate certain genetic traits of maize crop genotypes (Rezer, Jemeson, Bohoth-106 and Baghdad-3) and their response to phosphate fertilizer (0, 120 and 240) kg P ha⁻¹. The treatments were applied in accordance with factorial type in three replications by randomized complete block design (RCBD). The different genotypes were randomly distributed within each block and agriculture was carried out on 20/8/2023.

Result: The analysis of genetic, environmental and phenotypic variances in grain yield were 0.132642, 0.00163 and 0.134272, respectively. The heritability degree was 98.78% and the phenotypic and genetic difference coefficients were 7.992387 and 7.943727%, respectively. The results of the hierarchical cluster analysis also displayed the amount of genetic convergence between the genotypes Bohoth-106 and Baghdad-3 amounted to 216.449, which is the closest genetically between them and that the higher amount of genetic dimension was between the genotypes Rezer and Baghdad-3 amounted to 4282.256 and between the genotypes Rezer and Jemeson amounted to 1025.178, which can be used in hybridization to highlight the strength of the hybrid. While the genetic-distance between the genotype Jemeson and Bohoth-106 were 363.817, the genetic stability analysis showed that the genotype Baghdad-3 (G4) is the ideal genotype due to its high yield and genetic stability.

Key words: Cluster analysis, GGE-biplot analysis, Heritability, Maize (*Zea mays* L.) genotypes, Variations.

INTRODUCTION

The maize (*Zea mays* L.) is considered as main cereal crop as this crop comes next to the rice and wheat in terms of economic importance due to its versatility (Aziz and Sattar, 2024; Mauriya *et al.*, 2026). As maize is mostly cultivated as a grain diet crop, the bread and pastries are made by combining its flour with spelled wheat. The seed starch is used for making many type of sweets, Given the importance of this crop and due to its low productivity in Iraq, it invites us to seriously search for all possible means to increase the yield and among the most important means is the cultivation of genotypes that have high productivity to test the extent to which these genotypes respond to the conditions of the study area that achieve high productivity in quantity and quality (Mahmood *et al.*, 2025), as well as many agricultural operations, foremost of which is the adding phosphate nourishment. Alongside the ongoing supply of novel genotypes, contemporary scientific techniques are being implemented for the benefit of the crop, beginning with planting in soil and concluding with harvesting and among those main agricultural operations is the implementation of adding varying phosphate fertilizer levels to reach the ideal amount that contributes towards increasing production per unit area (Ali *et al.*, 2025). It is

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known that the application of agricultural operations by correct scientific methods (such as the adoption of genotypes and different levels of phosphate fertilizer plays a significant part in raising agricultural production rates and adding different levels of phosphate fertilizer is one of the ways that facilitate agricultural operations effectively and help improve the characteristics of the yield (Sharif *et al.*, 2026). Suitable genotypes cultivation for the area