

EFFECT OF TILLAGE PRACTICES ON DURUM WHEAT (*TRITICUM DURUM*) PRODUCTIVITY UNDER SEMI-ARID CLIMATIC CONDITIONS.

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Cereal cultivation remains a cornerstone of Algerian agriculture, with barley and wheat covering approximately 5 million hectares annually, representing around 60% of the country's agricultural land. These crops are primarily grown in semi-arid and arid regions under rain-fed conditions, making their productivity highly dependent on irregular and unpredictable rainfall. This climatic variability is a major factor contributing to low yields. Moreover, the tillage practices currently in use are often poorly adapted to such challenging environmental conditions.

The adoption of conservation tillage seeks to mitigate the negative impacts associated with conventional tillage, including soil erosion, compaction, and the depletion of organic matter. By preserving natural resources, particularly soil conservation, tillage offers significant agronomic and environmental benefits. The adaptation and dissemination of no-till systems with surface mulch open new prospects for the sustainable development of cereal production in semi-arid regions.

The main objective of this study is to evaluate the impact of four tillage systems—conservation tillage (notably no-till systems using the “Boudour” and “John Shearer” direct seed drills), conventional tillage, and minimum tillage—on the development of the Vitron variety of durum wheat. The field experiment was conducted over two growing seasons at the Technical Institute of Field Crops in Sétif, a region characterized by a semi-arid climate.

The results showed that tillage practices significantly influenced wheat productivity, root development, and emergence rate. The “Boudour” direct seed drill achieved higher emergence rates and greater root density compared to the “John Shearer” drill. However, conventional tillage yielded the highest root density ($1.85 \text{ g} \cdot \text{dm}^{-3}$) and grain yield ($42 \text{ qx} \cdot \text{ha}^{-1}$), while the lowest yield ($16 \text{ qx} \cdot \text{ha}^{-1}$) was recorded under the John Shearer direct seeding system. Although grain weight per spike and spike length were not significantly affected by tillage type, the number of grains per spike and tillering were notably influenced.

These findings underscore the importance of selecting appropriate equipment and tillage strategies to optimize wheat production in water-limited environments, and they support the promotion of locally developed seeding technologies for more sustainable agriculture.