

# The Influence of Some Secondary Tillage Implement and Mixing Organic Residues on Some Physical Properties of Soil at the Beginning and End of the Oat (*Triticum aestivum* L.) Growing Season

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**Abstract.** The study was conducted in one of the fields affiliated to the Agricultural Research Station at the University of Basra, Karmat Ali site. The agricultural field experiment was carried out by dividing the field land according to the Randomized Complete Block Design (RCBD) in a one-time split plots design, where the main plots represent smoothing machines and sub-plots, the levels of organic residues and three replicators. The soil was plowed with a moldboard plow at a depth of 25-30 cm, and the organic residues were mixed with the soil by use of secondary tillage equipment. While the area of the experimental unit was (150 \* 250) cm<sup>2</sup>, a distance of 2m was left between the experimental sectors and units to ensure that there was no overlap between the treatments. Seeds of oats were planted for all experimental units after the implementation of the treatments and at a seeding rate according to the recommendation followed in the region. Soil characteristics are measured for depths (0-15, 15-30) cm and for two periods (beginning and end of the plant growing season), and plant growth and yield indicators are measured at the end of the growing season. The aim of the research is to study the effect of adding levels of manure residues mixed with the surface layer in different ways on soil characteristics at the beginning and end of the oat crop growing season. The results of the experiment indicate the superiority of the spring cultivator and the percentage of adding organic residues (40 tons. Ha<sup>-1</sup>) over the rest of the machines and fertilization treatments by achieving the lowest apparent density at the beginning and end of the oats growing season, which amounted to 0.992 and 1.113 Mg m<sup>-3</sup>, respectively. In addition, they have achieved the highest the percentage of total porosity was 62.56 and 57.97 %, respectively. It also gave the highest weighted average diameter, which reached 0.859 and 0.688 mm, respectively. In addition, it gave the lowest soil penetration resistance, which reached 0.887 and 1.130 MPa, respectively.

**Keywords.** Disc harrows, Axe harrows, Spring cultivator, Rotary plough, Bulk density.

## 1. Introduction

The use of agricultural mechanization in an integrated manner in the performance of agricultural operations has achieved a great leap in agricultural production in terms of quantity and quality by conducting plowing operations with multiple systems and performing smoothing operations. The

