

# Effect of Soil Pulverization Index and Forward Speed for Agricultural Machinery on Some Soil Properties for Compacted Soil Depths

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## Abstract

In one of Agriculture college fields – Basrah University in Garmit Ali campus an experimental field conducted in silty clay loam soil to study the effect of soil pulverization index and forward speed for agricultural machinery on some soil properties for compacted soil depths. The soil was tilled by moldboard by different speeds to get on three soil block its pulverization index 53.52, 21.06 and 7.55mm (P.I<sub>1</sub>, P.I<sub>2</sub> and P.I<sub>3</sub>). Then the tractor passed on these pulverized soil blocks with three forward speeds of 0.49, 0.74 and 1.05m.s<sup>-1</sup> (S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub>). After that, measured soil penetration resistance (P.R.), dry bulk density ( $\rho_b$ ) and total porosity ( $f$ ) on four soil depths 0-5, 5-10, 10-15 and 15-20cm (D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub> and D<sub>4</sub>). The results indicated that the S<sub>1</sub>, P.I<sub>1</sub> and D<sub>1</sub> gave a lower P.R (2.07, 1.96 and 0.66 Mpa respectively) and  $\rho_b$  (1.13, 1.11 and 1.00 Mg.m<sup>3</sup> respectively) and a higher  $f$  (57.48, 58.10 and 62.35% respectively). The interaction between these factors gave different indicators. Where, the S<sub>2</sub>P.I<sub>1</sub>, S<sub>1</sub>P.I<sub>1</sub> treatments had the lowest values for P.R (1.85 and 1.86 Mpa respectively) and  $\rho_b$  (1.09 and 1.10 Mg.m<sup>3</sup> respectively) and the highest values for  $f$  (59.05 and 58.54 %respectively). Additional that, the S<sub>2</sub>P.I<sub>1</sub>D<sub>1</sub> and S<sub>1</sub>P.I<sub>1</sub>D<sub>1</sub> reached lower values for  $\rho_b$  (0.88 and 0.91 Mg.m<sup>3</sup> respectively) and higher values for  $f$  (66.82 and 65.75 %respectively).

**Keywords:** soil compaction, tractor traffic, tractor passed, agricultural machine, pulverization index, tractor forward speed.

## Introduction

Soil compaction occurs when soils are subject to stresses that exceed their strength (18). The researchers show that approximately 68 million hectare of lands in the world suffers from compaction (14). Soil compaction is one of the major problems facing modern agriculture which mainly

resulted on the overuse of heavy machinery (13 and 20). The Soil Science Society of America (SSSA) defines compaction as "the process by which the soil grains are rearranged to decreases void space and bring them in to closer contact with one another, thereby increasing the bulk density" (19). So that, the compaction has