



DOI: <https://doi.org/10.25130/tjas.25.1.2>

Evaluation of the performance of developed combined plowing machine under different operation circumstances

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KEY WORDS:

Plowing Machine; Pulverization Index; Soil Moisture; Plowing Depth; Draft Force; Disturbed Area

Received: 01/04/2024

Revision: 30/09/2024

Proofreading: 26/12/2024

Accepted: 13/03/2025

Available online: 31/03/2025

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ABSTRACT

Field experiments were conducted at the Agricultural Research Station of the College of Agriculture, University of Basrah, in Al-Hartha District, Basrah Governorate, to study the effect of soil moisture and plowing depth on the performance of a soil plowing machine consisting of a subsoiler plow, two shallow tins with wings on the outside, and addition to a disc harrows, including requirements draft force, soil disturbance, and Mean Weight Diameter (MWD). The machine has an important role in the plowing operations and preparing for agriculture in one operation, this will lessen the traffic times and the other economic works, the subsoil plowing, and the fragmentation of soil. The machine was used with and without discs for three levels of soil moisture content (SMC) (9, 18, and 28%), and three plowing depths (40, 50, and 60cm). The experiments were applied using a randomized complete block design (RCBD) of a factorial experiment (3 x 3 x 2) with three replications. The results showed a variation in the requirements of the draft force when the SMC changes, the values of draft force were 33.3, 32.64, and 31.66kN for the SMC of 9, 28, and 18%, respectively. Adding discs had a significant effect on the draft force it increased by 1.11kN. The draft force increased when the plowing depth was increased, the depth of 60cm gave the highest value of 35.92kN. The SMC of 18% was recorded as the largest disturbed area at 0.42m² and the least MWD by 31.59mm, followed by the SMC of 28% and then 9%, it was the least disturbed area at 0.38 and 0.35m², and MWD by 40.25 and 38.65mm respectively. The depth of 60cm is recorded as the largest disturbed area of 0.51m², and MWD 30.59mm. The addition of discs decreased the MWD by 6.9 mm compared to the absence of discs.