**A Cleaning Device to Improve the Seeding Performance of a Zero-Tillage Seeder**

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**Abstract**

Unlike the conventional tillage (CT), under conservation tillage, a large amount of crop residues remains covering the ground surface. Crop residues on the soil surface present a constraint to the adoption of no-till because they complicate seeding operation and thereby, they reduce crop yields. Therefore, the use of an improved row cleaner is a crucial step for booming seeding practices. Accordingly, a two-year field experiment was conducted on a silty clay loam soil at the Experimental Farms of the College of Science of Agricultural Engineering/ University of Salahaddin, Erbil (N 360 06' 48.9'' – E 440 00' 45.0” and at a mean altitude of 412 m amsl) during 2016-2017 and 2017-2018. Split-split plot experiments were conducted in a completely randomized block design using three factors with three replicates. The factors were the type of seeder modification (M1= without modification, M2= with narrow modification, and M3 = with wide modification) assigned to the main plots, travel speed sub-plot (S1= 8, S2=9, and S3=11 km hr-¹) and seeding depth sub-sub plot (D1= 4.5 cm and D2= 6.5 cm). The main objective of the study was to evaluate the performance of two types of seeder modification via studying machinery, soil, and wheat plant indicators.

The results indicated that both slippage percent and draft force tended to increase with increasing the travel speed and seeding depth. The minimum slippage percent and draft force were recorded under M2S1D1, while the highest values for these two parameters were recorded under M3S3D2. The fuel consumption tended to decrease with an increasing the travel speed. It tended to increase with an increase in the seeding depth. The treatment combinations M1S3D1 and M2S1D1 consumed the lowest and highest values of the fuel, respectively. The results also elucidated that the percentage of reduction crop residue left under M2 and M3 were 54% and 44% compared to that under the M1 treatment. It was also observed that the treatment combinations M3S1D2 and M1S3D2 offered the lowest and highest percent of germination. No obvious trend was observed between percent of germination and each of travel speed and seeding depth.

Additionally, the highest and lowest grain yield were recorded under the treatment combinations of M2S3D1 and M3S3D1, respectively.

**Keywords**: Conservation tillage, row cleaner, seeding performance, travel speed, and zero tillage.