Turkish Journal of Agriculture and Forestry

Effects of Minimum and Conventional Tillage Systems on Soil Properties and Yield of Winter Wheat (Triticum aestivum L.) in Clay-Loam in the Çanakkale Region

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Abstract: The experiment was conducted during the 2001-2003 cropping period to evaluate the effects of 3 tillage systems, conventional tillage (CT), and minimum tillage with rototiller (MTR) and disc (MTD), on the soil properties and wheat yield (Triticum aestivum L.). Based on 2-year results, soil bulk density at 0-10 cm in the growing period in MTR, CT and MTD was 1.20, 1.34 and 1.24 Mg m^{-3} respectively. Corresponding values at 10-20 and 20-30 cm were 1.26, 1.29 and 1.21 Mg m^{-3} and 1.30, 1.27 and 1.40 Mg m^{-3} respectively. Aggregate size distribution and mean weight diameter throughout the 2 years of the experiment were significantly influenced by the tillage systems. The highest organic carbon was obtained from MTR, followed by MTD and CT. Similarly, total N in the soil was highest in MTR, followed by CT and MTD. Penetration resistance was measured pre-fall tillage, and during the growing period and gave the following values ($P < 0.05$) for CT, MTR and MTD: 1.65, 1.18 and 1.57 MPa, and 1.33, 1.35 and 1.76 MPa at 18-30 cm. Although there were no statistically significant differences between the tillage systems, grain yield was higher in MTR than in CT and MTD. Consequently, we expect MTR to be more sustainable because of increased grain yield and improving soil physical properties over the long term compared with CT and MTD.

Key Words: Minimum tillage, aggregation, penetration resistance, bulk density, wheat yields