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Impact of Tillage Practices on Dry Soil Aggregate Distribution in Different Soil Types in Austria

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Abstract

Soil aggregation is one of the main factors controlling the chemical, physical, and biological processes that contribute to soil productivity and agricultural sustainability. A research was conducted to investigate the impact of different tillage practices on dry mean weight diameter (DMWD) in different soil types and to determine the range of aggregate sizes that are affected by tillage practices in spring and autumn. Composite surface soil (0–10 cm) samples were collected from five experimental sites treated with different tillage practices in spring and autumn 2008 in lower Austria. The management practices were conventional tillage (CT), reduced tillage (RT) and No till (NT) that are implemented for different period of time. The soil textures were loam (L), sandy clay loam (SCL), clay (C) and silt loam (SL). Samples were air dried and passed through a nest of sieves to provide soils with aggregate sizes <1 mm, 1–2 mm, 2–4 mm, 4–8 mm and 8–22.4mm. The overall result shows that NT has significantly higher ($p < 0.0001$) DMWD followed than RT and RT has also significantly higher DMWD than CT. NT in L and C has significantly higher DMWD than in all other soil types and tillage practices. This shows the strong interaction (0.0136) between tillage practices and soil texture. L has the highest DMWD than SCL and C whereas SL has the lowest. The DMWD of all soils in autumn was significantly ($p < 0.0001$) higher than in spring. In general, the application of NT resulted in 2 % to 26 % increase in DMWD. NT produced significantly higher amount of large aggregates (8–22.4 mm) and lower amount of small aggregates (<1 mm) than RT and CT in autumn in C and L. Tillage has no effect on 2–4 mm aggregates. This study suggests that implementation of conservation tillage practices improve the stability of larger aggregates. Further research has to be done in order to see the impact of tillage practices on wet mean weight diameter and aggregate stability.

Keywords: Tillage! practices, no tillage, reduced tillage

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