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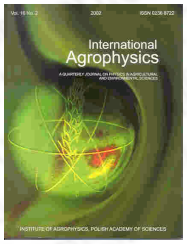

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Changes in pore size distribution and aggregate stability of two soils under long term tillage systems

(get PDF)

J. Pranagal[1], J. Lipiec[2], H. Domżał[1]

[1] Institute of Soil Science and Environment Management, University of Agriculture, Leszczyńskego 7, 20-069 Lublin, Poland

[2] Institute of Agrophysics, Polish Academy of Sciences, Doświadczalna 4, P.O. Box 201, 20-290 Lublin 27, Poland

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abstract Tillage-induced changes in pore-size distribution and aggregate stability of two soils were investigated for 7 con- secutive years from 1994 to 2000. The three tillage treatments were used: conventional tillage with mouldboard plough (CT), ploughless tillage with cultivator (PL) and direct drilling (DD). The experiments were conducted on loam soil (Eutric Cambisol) derived from boulder clay and silt loam soil (Haplic Luvisol) derived from loess. Soil samples were collected at depths of 0-10 and 10-20 cm. Pore size distribution was calculated from the water retention curve. Water stability of aggregates (10-5, 5-1 and <1 mm) was determined by wet sieving method. Macroporosity (>20 mm) at a depth of 0-10 cm, varying initially from 0.035 to 0.062 m3 m-3, increased during seven years substantially in both the loam (from 1.7 in DD to 3.6 times in CT) and the silt loam (from 1.3 in CT to 3.4 times in PL and DD). The increase for the depth of 10-20 cm was relatively greater in silt loam (from 1.7 in PL to 2.8 times in DD) as compared with loam (from 1.3 in DD to 2.1 times in PL). During the first four years of the experiment, the contribution of mesopores (0.2-20 mm) decreased in all treatments to higher extent in loam than in silt loam. Temporal changes in microporosity (<0.2 mm) were much smaller than for other size classes of pores. The differences between the treatments were more pronounced for the 0-10 cm than for the 10-20 cm depth. Irrespective of the treatments, the aggregates of 10-5 and 5-1 mm were more stable in the loam than in the silt loam soil. Improved water stability of aggregates of 10-5 and 5-1 mm under PL and DD suggest that the tillage systems are sustainable in soils conducive to soil erosion.

keywords tillage systems, bulk density; pore size distribution, aggregate stability