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Does strip-tillage could limit the drop of yields on soils of reduced depth of profiles in loess areas?

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Strip tillage restrict a tillage operation to seed rows and enables a combination of tillage, sowing and application of fertilizers during one pass of agricultural machines. The practice decreases the costs of fuel and limits the risk of water erosion by the increase of infiltration of soil water. In the studies, we put a hypothesis that strip tillage is a tool to increase the yields on soils of reduced profiles.
Studies were carried out in the loess area of the Lublin Upland (Poland). The site is cultivated from the beginning of the 18th century, and strip tillage is performed from 2008. All plant residues is left after harvest in the field and mixed with the soil by disc harrow. Measurements of solum depth (Ap-BC), soil properties and parameters of plant growth were carried out in 108 points in the field of the area of 4 ha. Crops included winter wheat (2014) and maize (2015). Studies showed that the profiles of Haplic Luvisol were largely truncated or overbuilt due to erosion and moldboard plow in the past. Solum depth ranged from 0.2 to 3.6 m (mean=1.29 m, CV=64%), and soils with the non-eroded, slightly, moderately, severely, very severely eroded and depositional profiles represented 13, 32, 10, 5, 8 and 32% of total number of cores, respectively. In a result of modification of profiles, clay content ranged from 84 to 222 (145; 16%) in the layer of 0-15 cm, whereas SOC concentration remained on relatively low level and ranged from 4.3 to 16.8 g/kg (9.1; 21.4%). Soil water content (SWC) within depth of 1-m profile was differentiated at the start of measurements in the middle of June 2015. The SWC was the highest in non-eroded and depositional soils and the smallest in severely and very severely eroded soils. The difference of 5% has maintained during the whole growing season and did not affect the growth of plants till the phase of flowering. Then, the plants on shallower soils passed quicker to the next phenological phases in comparison to the plants on deeper soils. The difference was reflected in the level of yields. The largest yields of 11.2 Mg/ha (wheat) and 14.4 Mg/ha (maize) were registered on non-eroded and depositional soils, and the smallest of 8 Mg/ha on severely and very severely eroded soils for wheat, and on moderately, severely, and very severely eroded soils for maize. The studies showed that SWC is the main factor that limits the yields in the loess areas of East Poland. After 6 years of the use of strip tillage, the yields are maintained on high level on non-eroded and depositional soils, however, the strip tillage could not be able to equalize the yield within the studied field. We conclude that soil quality of the soils of loess area could be improved by application of special measures that increase soil water content in the zones of shallower soils and soils of reduced profile depth.