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Influence of Soil Tillage Systems on Soil Respiration and Production on Wheat, Maize and Soybean Crop

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Soil respiration leads to CO_2 emissions from soil to the atmosphere, in significant amounts for the global carbon cycle. Soil capacity to produce CO_2 varies depending on soil, season, intensity and quality of agrotechnical tillage, soil water, cultivated plant, fertilizer etc.
The data presented in this paper were obtained on argic-stagnic Faeoziom (SRTS, 2003). These areas were was our research, presents a medium multiannual temperature of 8.20C, medium of multiannual rain drowns: 613 mm. The experimental variants chosen were: A. Conventional system (CS): V1–reversible plough (22-25 cm)+rotary grape (8-10 cm); B. Minimum tillage system (MT): V2 – paraplow (18-22 cm) + rotary grape (8-10 cm); V3 – chisel (18-22 cm) + rotary grape (8-10 cm);V4 – rotary grape (10-12 cm); C. No-Tillage systems (NT): V5 – direct sowing. The experimental design was a split-plot design with three replications. In one variant the area of a plot was 300 m2. The experimental variants were studied in the 3 years crop rotation: maize - soy-bean – autumn wheat.
To soil respiration under different tillage practices, determinations were made for each crop in four vegetative stages (spring, 5-6 leaves, bean forming, harvest) using ACE Automated Soil CO_2 Exchange System. Soil respiration varies throughout the year for all three crops of rotation, with a maximum in late spring (1383 to 2480 mmoli m-2s-1) and another in fall (2141 to 2350 mmoli m-2s-1). The determinations confirm the effect of soil tillage system on soil respiration, the daily average is lower at NT (315-1914 mmoli m-2s-1), followed by MT (318-2395 mmoli m-2s-1) and is higher in the CS (321-2480 mmol m-2s-1).
Productions obtained at MT and NT don't have significant differences at wheat and are higher at soybean. The differences in crop yields are recorded at maize and can be a direct consequence of loosening, mineralization and intensive mobilization of soil fertility.

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