

Acid soils CO₂ respiration under conservation tillage, different fertilization and liming

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Good microbial activity plays a crucial role in soil health status and it is important for decomposition of organic matter, cycling of nutrients (especially P and N), formation of humus and stabilization of soil aggregates. It is known that Conservation tillage can positively affect higher accumulation of organic matter especially in the surface soil which can lead to a higher soil microbial activity. This activity can be measured through CO₂ respiration from soil. Hence, the main objective of the study is how improved land management practices can affect evolved CO₂-C which represents microbial activity as one of the most important soil health indicators. Two experiments were established in Croatia on two soil types Stagnosol and Gleysol both with acid soil reaction. Cultivated crop was corn and the treatments were: ST-Standard Tillage (deep mouldboard ploughing), CTD-Conservation System Deep (without ploughing and with minimum 30% of surface covered with plant residues), CTS-Conservation System Shallow (tillage up to 10 cm and minimum 50% of surface covered with plant residues). Liming CY-treatment with applied lime (according to recommendation) and CN-treatment without liming and fertilization, FR-according recommendation (NPK), FD-fertilization decreased by 50% compared to recommendation, GFR-fertilization according recommendation + 300 kg ha⁻¹ Geo2 (biophysiological soil activator), GFD-fertilization decreased by 50% + 300 kg ha⁻¹ Geo2 and. Soil samples were taken at two soil depths (0–15 cm and 15–30 cm). Measurement of evolved CO₂-C is done by using commercial soil health test 24h Solvita CO₂-burst test. CO₂ respiration was significantly affected by tillage, fertilization and liming on both localities. Highest evolved CO₂-C was measured on 15 to 30 cm on Gleysol (treatment CTS, CN, GFD) 193.00 CO₂-C kg⁻¹. On 0 to 15 cm on both soil types the highest evolved CO₂-C are recorded on CTS tillage treatments with liming and GFD fertilization (Stagnosol 95.37mg CO₂-C kg⁻¹; Gleysol 62.63 CO₂-C kg⁻¹). On both depths and localities, the lowest measured evolved CO₂ was on ST. Concentrations of evolved CO₂-C measured in CTS treatment confirms the positive influences of Conservation tillage on increasing microbial activity on acid soils especially in surface soil (0–15 cm) and also good applicability of Solvita CO₂-burst test.

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