2024 International Soil Tillage Research Organisation Conference

23 September - 27 September 2024
Wyndham Virginia Beach Oceanfront, 5700 Atlantic Avenue, Virginia Beach, VA 23451

Abstract ID: ISTRO41 **Abstract Topic:** Tillage **Submission Type:** Poster presentation

Effects of conservation tillage on soil properties and soybean yields on Stagnosol, Eastern Croatia

Irena Jug*, Danijel Jug, Boris Đurđević, Bojana Brozović, Vladimir Zebec, Vesna Vukadinović, Monika Marković, Antonija Strilić

**Faculty of Agrobiotechnical Sciences Osijek, University of Josip Juraj Strossmayer in Osijek, Vladimira Preloga 1, Osijek, Croatia (ijug@fazos.hr)*

Abstract

Proper land management practices are crucial for improving the productivity of Stagnosols. The productivity of Stagnosols is influenced by their poor drainage, nutrient dynamics, soil aeration, organic matter decomposition rates, and the types of vegetation and crops that are best suited to these conditions. The production capacity of natural, unmodified, Stagnosol is low. They are usually used as such in agricultural production, but they give very variable yields, which depend greatly on the amount of rainfall distribution and applied agricultural technology. Conservation tillage protect soil from degradation processes and ensures more moisture storage, reduces erosion, benefits the crop in arid and semiarid areas by reducing drought risk and increasing grain yield. During 2022 the effects of different tillage systems, fertilization treatment and liming on soil properties and soybean yields were investigated on Stagnosol in Eastern Croatia. Cultivated crop was soybean and the treatments were: ST-standard tillage (deep moldboard plowing, up to 30 cm), CTD-Conservation Tillage Deep (chiseling up to 30 cm and minimum 30% of surface covered with plant residues), CTS-Conservation Tillage Shallow (tillage up to 10 cm and minimum 50% of surface covered with plant residues). Liming was applied with two different variants: CY-treatment with liming (according to recommendation for neutralization soil pH) and CN-treatment without liming. Fertilization treatments include: 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. The results showed that Soil Organic Carbon (SOC), water content and soil bulk density were significantly influenced by the tillage, liming and fertilization treatments. The highest content of SOC (1.64%) and the lowest soil bulk density (1.26 g cm^{-3}) were recorded on CTD/CY/GFD while highest value of soil bulk density (1.59 g cm^{-3}) and water content (39.23%) were recorded on ST/CY/FD respectively ST/CN/FD. The highest grain yields (4.84 t ha^{-1}), biological yield (11.24 t ha^{-1}) and harvest index (46.34%) were achieved on conservation tillage systems (CTD/CY/GFR and CTS/CY/GFR). Properly selected sustainable land management practices are essential for maintaining long-term soil productivity and reducing soil degradation caused by agricultural activities, especially on soils with poorer productive

capabilities. Effective management practices, like conservation soil tillage, liming and optimal doses of fertilizers with the use of biophysiological soil activators are essential to mitigate the challenges posed by Stagnosols and improve their productivity.

Keywords: conservation soil tillage, Stagnosol, soil properties, soybean yield

This work has been fully supported by Croatian Science Foundation under the project "Assessment of conservation soil tillage as advanced methods for crop production and prevention of soil degradation – ACTIVEsoil" (IP-2020-02-2647).