Design and Evaluation of an Alley-Cropping System for Ramial Wood Chip Production: Initial Results Three Years Post-Establishment

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Background

Ramial wood chips (RWC) are produced from wooden branches (~7–8 cm) and application to agricultural soi has the potential to improve soil organic matter contents and soil fertility. In spring 2023, an alley-cropping system was established at Agroscope in Nyon, Switzerland (Fig.1). The system consists of five hedgerows (6 m × 100 m), each composed of four rows of *Salix viminalis* hybrids ('Discovery' and 'Endeavour'), with 2 m spacing between rows and 0.5 m spacing within rows (density = 1.3 stem/m^2). Each alley is subdivided into five plots (20 m × 21 m) that received five different amounts of RWC (four replicates, 20 plots in total). The four crop alleys are managed under a four-year crop rotation including winter wheat, rapeseed, winter wheat and soybean.

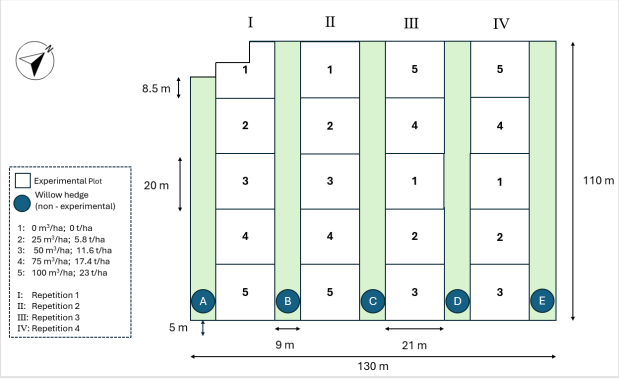

Figure 1: Design of the field trial.

Preliminary results

Hedgerow aboveground biomass showed a clear dependence on the location, likely due to the inherent slope and the soil stone content, affecting water availability (Fig. 2).

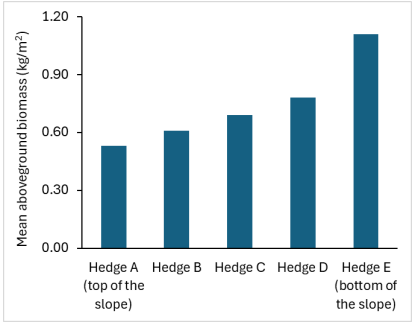

Fig. 2: Mean hedge biomass in spring 2026. Values are derived from a locally-developed allometric model linking basal diameter to biomass.

Yield of winter wheat was significantly ($p < 0.05$) higher in the center of each crop alley, irrespective of no (0), intermediate (3) or full (5) RWC application rate (Figure 3). Yield was lowest on the east border and slightly higher on the west boarder. This boarder effect is likely related t to differences in photosynthetic active radiation due to the shading of the hedges.

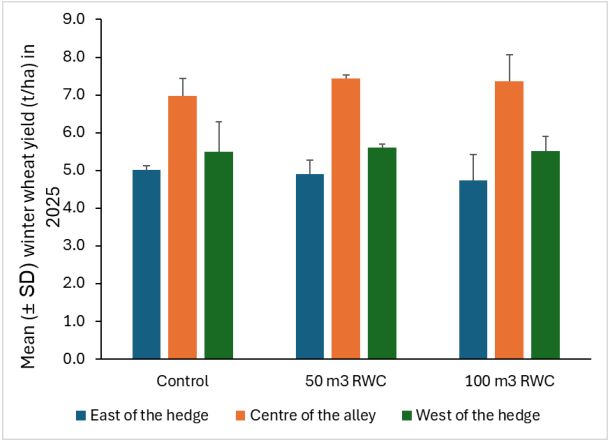

Fig. 3: Yield of winter wheat harvested in 2023 for three of the RWC application rates.

After 2.5 years of application (autumn 2025), concentrations of soil organic carbon (0-20 cm sampling depth) was increased with RWC application rates (Fig. 4), yet not at statistically significant levels. Application at the highest rate (5) increased soil organic carbon by 16%, compared to the control treatment (1).

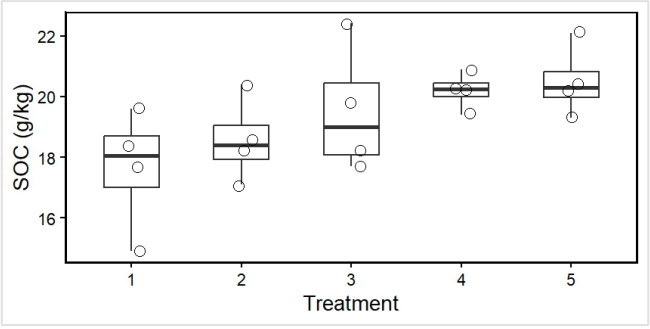

Fig. 4: Concentrations in soil organic carbon (0-20 cm) in the five different treatments. For BRF treatment application levels see caption in Fig. 1

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