INTERNATIONAL CONFERENCE ON FOOD SECURITY 2025
"Exploring Cutting-Edge Research and Innovation in Food Security for a Better Tomorrow"
11-12 November 2025

Impact of Soil Tillage and Fungicide Application on Wheat Quality

[1]Thomas Croci*, [2]Davide Mazzitelli, [2]Barbara Chicco, [3]Raffaele Meloni, [3]Claudia Sardella, [3]Massimo Blandino, and [1]Alessandra Marti

[1]Department of Food, Environmental and Nutritional Sciences (DeFENS), Università degli Studi di Milano, Milan, Italy.
[2]Soremartec Italia S.r.l., Ferrero Group, Alba, Torino, Italy.
[3]Department of Agricultural, Forest and Food Science, Università degli Studi di Torino, Grugliasco, Torino, Italy.

*Corresponding author (email): thomas.croci@unimi.it

Type of presentation: Oral

Abstract:
Regenerative agriculture practices, such as reduced soil tillage, could provide a solution for agriculture to counteract the negative impacts of climate change, by enhancing soil carbon sequestration, reducing carbon dioxide emissions in the atmosphere, and strengthening the resilience of cropping systems. While effects on soil fertility and crop yields have been investigated, limited research has explored how this practice influences the technological quality of wheat. Therefore, this study seeks to evaluate the impact of minimum tillage, in combination with fungal diseases, on wheat grain and flour quality.
For the experiment, an ordinary breadmaking wheat cultivar was grown in 2024 by comparing according to a full factorial design two soil tillage, the conventional ploughing (30 cm) *vs* the minimum tillage (15 cm) by disk harrowing, and 2 disease managements, the untreated control *vs* the use of a synthetic fungicide at flowering. Agronomic (grain yield) and qualitative features of kernels (test weight and protein content) and flours (gluten aggregation properties by GlutoPeak, starch pasting properties by Micro Visco-Amylo-Graph, and dough mixing properties by Farinograph) were investigated. Grain yield did not differ within ploughing and minimum tillage when fungicide was applied; otherwise in the untreated control condition, the minimum tillage treatment resulted in a 32% lower yield compared to ploughing. The grain protein content was lower in minimum tillage compared to ploughing. Minimum tillage negatively affected kernels quality traits, also weakening the gluten network and reducing the dough development time and stability during mixing, but fungicide application mitigated these effects. On the other hand, the gelatinization and retrogradation properties of starch were not adversely affected by this agronomic practice. In conclusion, minimum tillage is a promising strategy for climate change mitigation, but requires a fungicide use to ensure effective implementation and minimize the potential negative effect on wheat quality.

Project funded by PNRR, Mission 4, component 2 "From research to industry" – Investment3.3 "Introduction of innovative PhD programs that address the innovation needs of companies and promote the hiring of researchers by businesses".

Keywords: regenerative agriculture; minimum tillage; wheat quality, gluten aggregation properties, dough mixing properties.