Abstract

Evaluating Cover Crop Integration in a Prairie Crop Rotation: Cover Crop and Cash Crop Productivity

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Cover crops (CCs) are a key component of regenerative agriculture, offering numerous soil health benefits. However, their adoption across the Canadian Prairies is constrained by short growing seasons and limited moisture. More research is needed to evaluate CC productivity and their impacts on cash crop production in Prairie cropping systems. This research project, as part of a fully phased, long-term rotation study, evaluated CC performance and their effects on cash crop productivity over two years (2024-2025) at Glenlea and Carman, Manitoba. Treatments included a 4-year annual crop rotation with CCs (4yr+CC) and without CCs (4yr-CC), alongside two controls: a 2-year wheat-canola rotation (2yr) and a perennial alfalfa crop. The 4-year rotation consisted of wheat, canola, oat, and soybean as cash crops. Subterranean clover, Italian ryegrass, and fall rye were planted with wheat, soybean, and oat, respectively, while a mixture of red clover, white clover, and Italian ryegrass was interseeded with canola. CC productivity was measured as biomass before fall freeze-up. Cash crop productivity was assessed via pre-harvest biomass and post-harvest grain yield in the 4yr+CC and 4yr-CC treatment. CC integration reduced wheat, and oat yields by 9% and 18%, respectively, but had no impact on soybean yield. CC biomass production varied between site-years, with the higher production observed at both sites in 2025 for all CCs except fall rye, relative to 2024.