

## **Effects of Cover Crops on N<sub>2</sub>O Emission in Southern Manitoba**

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This study evaluates the impact of fall-seeded cover crops on nitrous oxide (N<sub>2</sub>O) emissions and grain yield in a four-year fully phased crop rotation (wheat, oat, canola, soybeans) over multiple years at two sites. The objectives were to assess the effect of cover crops on N<sub>2</sub>O emissions, compare overwintering versus non-overwintering cover crops, evaluate emissions during thaw periods, and investigate whether terminating overwintering cover crops increases emissions. Additionally, the study examined the effect of cover crop rotations on grain yield.

N<sub>2</sub>O emissions were measured using static vented chambers, and cumulative emissions were quantified. Results showed that overwintering cover crops reduced N<sub>2</sub>O emissions (163.15 g N ha<sup>-1</sup>) compared to non-overwintering cover crops (211.92 g N ha<sup>-1</sup>), with no significant increase in emissions during thaw periods. Termination of overwintering cover crops did not increase N<sub>2</sub>O emissions.

Regarding grain yield, Long Rotation Overwintering Cover Crop treatments (LR-OW-CC) consistently produced higher or equal yields compared to non-cover crop treatments, while Long Rotation Non-Overwintering Cover Crop treatments (LR-N/OW-CC) yielded lower or equal to non-cover crop treatments.

These findings suggest that cover crops, particularly overwintering types, can effectively reduce N<sub>2</sub>O emissions without compromising yield, offering a promising strategy for sustainable agriculture and greenhouse gas mitigation.