

## Contribution of different cover crop species to soil organic matter fractions and N<sub>2</sub>O emissions under Norwegian cereal production

Rittl, T. F.<sup>1</sup>; Bárcena, T. G.<sup>2</sup>; Farkas, E.<sup>3</sup>; Henriksen, T. M.<sup>4</sup>; Kjær, S. T.<sup>5</sup>; Dörsch, P.<sup>5</sup> and Frøseth, R. B.<sup>4</sup>

<sup>1</sup> Norwegian Centre for Organic Agriculture (NORSØK), Tingvoll, Norway

<sup>2</sup> Norwegian Institute of Bioeconomy Research (NIBIO), Department of Agricultural Soil Survey, NO-1431 Ås, Norway

<sup>3</sup>Norwegian Institute of Bioeconomy Research (NIBIO), Department of Biogeochemistry and Soil Quality, NO-1431 Ås, Norway<sup>4</sup>Norwegian Institute of Bioeconomy Research (NIBIO), <sup>4</sup>Department of Grain and Forage Seed Agronomy, NO-1431 Ås, Norway

<sup>5</sup>Norwegian University of Life Sciences, Faculty of Environmental Sciences and Natural Resource Management, NO-1434 Ås, Norway

\* **Presenting author:** Tatiana F. Rittl, [tatiana.rittl@norsok.no](mailto:tatiana.rittl@norsok.no)

In Norway, cover crops were introduced to prevent loss of nitrogen and phosphorous from fields to waterways. Today, cover crops are also used to restore soil organic matter and improve soil health. Yet, the direction and magnitude of these effects are variable, and little is known about the persistence of the C derived from the cover crops in the soil. In the CAPTURE project, we evaluated the soil C sequestration potential from different cover crops used in the main cereal production areas in Norway. To do so, we used pulse labelling with <sup>13</sup>C (CO<sub>2</sub>) to label four different cover crop species Italian ryegrass, phacelia, oilseed radish and summer vetch through their growing period. Cover crops were grown in a monoculture to enable the labelling. The results of the first year of the experiment show that cover crops produced 10- 14 Mg ha<sup>-1</sup> above ground biomass, corresponding to 4-6 Mg C ha<sup>-1</sup>. At the end of the growing season, 3-5% of cover crop C was found in the soil particulate organic matter (POM) fraction and 2-4% in the soil mineral organic matter fraction (MAOM). In the following years, the fate of C derived from the cover crops in the soil will be determined. Furthermore, the soil C sequestration of the different cover crops will be scaled to barley plots in the same experiment, to which cover crops had been undersown in spring or summer. In these plots, N<sub>2</sub>O emissions have been measured through the whole year. The greenhouse gas trade-offs of cover crops in Norwegian cereal production will be estimated.

**Keywords:** <sup>13</sup>C pulse labelling, particulate organic matter, mineral associated organic matter, freeze-thaw.