

# Predicting GHG emissions from horticultural peat soils using DNDC

Helen Taft<sup>1\*</sup>, Paul Cross<sup>1</sup>, Davey L. Jones<sup>1</sup>

1. School of Environment, Natural Resources and Geography, Bangor University, Bangor, Gwynedd, LL57 2UW, United Kingdom.

\* Corresponding author

**Abstract:** Peat soils represent an important global carbon sink, but can also provide a highly fertile medium for growing commercially important horticultural crops. The net greenhouse gas (GHG) emission (carbon dioxide, nitrous oxide and methane) from horticultural cropping rotations can be substantial. Sustainable crop production on peat soils involves a trade-off between ensuring food security and minimising GHG emissions and soil organic carbon loss. Quantifying net GHG fluxes through field data collection is both labour-intensive and costly; using a process-based model such as Denitrification-Decomposition (DNDC) is a useful proxy for estimating emissions.

While DNDC has been used to predict GHG emissions from peat soils (Wetland-DNDC) or cropped soils (various DNDC versions), the model has not yet been explicitly validated for this particular combination of soil and vegetation type. We parameterised the model using soil, weather and crop management data from three intensively cultivated arable sites on soils of contrasting organic matter contents (ca. 20%, 35% and 70% SOM content). Model output emissions of carbon dioxide, nitrous oxide and methane were compared to measured emissions for the 15-month period from April 2011 to June 2012. Here we present preliminary results from initial validation of the DNDC model for horticultural peat soils.

**Keywords:** Carbon dioxide, nitrous oxide, methane, soil organic carbon, peat soils, horticulture, DNDC.