EPA STRIVE Programme 2007-2013

Quantification of the components of the carbon budget at farm scale

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Executive Summary

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by

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Executive Summary

Grassland is the dominant land use in Ireland. There is a need to understand the carbon (C) sequestration status of these ecosystems in order to support national commitments under the United Nations Framework Convention on Climate Change and it's Kyoto Protocol. This study investigated the farm scale C balance at the Celticflux study site in Co. Cork, Ireland. Carbon dioxide (CO_2) fluxes were compared in new and permanent grassland using a chamber based experiment. Cumulative values of gross primary production (GPP), total respiration (R_{TOT}) and net ecosystem exchange (NEE) in the new grassland were 2.14, -1.98 and 0.15 kg C m^{-2} yr^{-1} respectively. In the permanent grassland cumulative values of GPP, R_{TOT} and NEE were 2.90, -2.52 and 0.38 kg C m^{-2} yr^{-1} respectively. R_{TOT} was partitioned into heterotrophic (R_H) and autotrophic respiration (R_A). During the period from late May until mid-August R_H and R_A both accounted for, on average, 50% of R_{TOT}. During the rest of the year R_H and R_A represented, on average, 62 and 38% of R_{TOT} respectively. The farm scale C balance was quantified by combining results of on-site eddy covariance studies with farm management data and emission factors derived from published literature. This assessment found that grassland is a sink for ~2 t C ha^{-1} yr^{-1}. There is a need for further research to partition this sink between the amounts sequestered in the soil and the vegetation. There is also a need to quantify the major components of the farm C balance and to upscale site level studies to regional and national level.