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Total N losses in managed grassland systems

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Losses of nitrogen as N2 constitutes a major fraction of the N-turnover in managed grassland systems and might be in the order of 30% of the applied N (van der Salm et al., 2007). Consequently this loss path is limiting the N efficiency.
In the framework of the EU IP project NitroEurope we aim to comprehensibly determine the nitrogen flows in a managed grassland system under a cut regime (i.e. no grazing). A major effort is devoted to establish an operational technique to determine total N-losses on 30 cm soil core using the acetylene inhibition technique. In a recent review by Groffman et al. (2006) the acetylene inhibition technique is considered as a robust technique for soils with a high inorganic nitrogen supply despite its serious limitations.
Soil cores are isothermally transported in the laboratory within less than three hours and then measured within the next 24 hours without and with addition of acetylene. The experimental systems allows to measure up to eight samples in parallel. The detection limit of the system is 10 ng N2O – N m-2s-1.
An estimate of the range of annual losses is presented with a discussion of potential biases.

References:
Groffman P. et al. (2006): Methods for measuring denitrification: diverse approaches for a difficult problem. Ecological Applications 16(6) 2091-2122

Van der Salm C. et al. (2007): Estimation of nitrogen losses via denitrificatrion from a heavy clay soil under grass. Agriculture, Ecosystems and Environment, 311-319