



Scenario Calculations to assess the Effects of the Swiss Policy Measures aimed at reducing Nitrogen Leaching from Arable Land

M. Decrem, F. Herzog, J. Nievergelt, W. Richner, and E. Spiess

AGROSCOPE FAL-Reckenholz, Zurich, Switzerland (michel.decrem@fal.admin.ch)

The overall objective of this study was to assess the effectiveness of ecological measures aimed at reducing nitrogen (N) leaching from arable land, with the small catchment defined as the scale of reference. The measures in question, implemented under the Swiss Agri-Environmental Support Scheme (“Oekologischer Leistungsnachweis“, OeLN), were the reduction in N fertilizer inputs and the use of catch crops. To avoid the high cost and impracticability of an extensive and comprehensive field monitoring campaign, we adopted a modeling approach to accomplish this study. In a first phase, we calibrated the process-based N leaching model LEACHMN (Hutson, 2003) at the ‘point’ or lysimeter scale, and then, in a second phase, we applied the model to the predominantly agricultural catchment of Fehraltorf in the Swiss Plateau. Each field in the catchment was interpreted as an equivalent soil column, for which the one-dimensional model calculated the water and N balances at a daily time step. Variations in spatial information such as soil characteristics and management practices were preserved through the use of a GIS. To quantify the effects of the implementation of each of the N leaching reduction measures taken individually, we predicted N leaching under various management scenarios for a continuous period of five hydrological years. The results showed that the implementation of the measures could have achieved a reduction of 20 – 30% ($10 - 20 \text{ kg N ha}^{-1} \text{ year}^{-1}$) of the amount of N leached from arable land.