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Using Data from Literature for Fuzzy Rule based Modelling of Nitrate Leaching

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Because of its great importance, many studies have dealt with the topic of nitrogen leaching from arable soils, each one producing new data and results. Still, it is very difficult to make adequate use of all this collective knowledge.

It is the aim of this study to examine if a quantitative calculation of nitrogen leaching is possible based only on literature data. The presented tool is a Fuzzy rule based model, trained with data collected from several publications. This data bank comprises measured and simulated values of nitrate leaching in dependence of natural and anthropogenic factors (soil parameters, precipitation, fertilization, crop information). The data are repeatedly separated into training and validation data sets. Using a non-linear, discreet numerical optimization method, the training data are used to generate an optimal Fuzzy rule system with subsequent validation. The results of the multiple split-sampling show good correlation between literature data and simulated nitrate leaching. This proves the possibility of a quantitative prognosis of nitrate leaching relying only on literature data.