

Evaluation of the DRAINMOD-N II model for predicting nitrogen losses in South-east Sweden

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Introduction

The development of computer simulation models has provided methods to describe the mechanisms of nutrient retention and release in drained areas. DRAINMOD-N II includes modules for simulating carbon and nitrogen dynamics in shallow water table soils with artificial drainage (Youssef et al., 2005).

Objective

The aim of this study was to evaluate the DRAINMOD-N II model for south-east Sweden.

Materials and Methods

The research area used in the simulations was established at Gärds Köpinge (South-east Sweden, 55°56'N, 14°10'E) in 2000 (Fig. 1).



Results

Statistical comparison showed good agreement between predicted and measured drain outflows and NO₃-N drainage losses (Table 1).

Table 1. Statistical comparison between observed (OBS) and simulated (SIM) drain outflows (cm) and NO₃-N losses (kg N ha⁻¹) from conventional drainage (plot 3) and controlled drainage (plot 2 and 4).

Plot	— cm —				— kg N ha ⁻¹ —			
	OBS	SIM	MAE [†]	EF [‡]	OBS	SIM	MAE [†]	EF [‡]
2	29.4	33.3	0.36	0.84	10.6	9.4	0.30	0.55
3	53.6	51.6	0.34	0.95	12.2	10.7	0.16	0.89
4	17.1	13.2	0.16	0.90	8.1	8.2	0.21	0.49

[†]MAE = mean absolute error comparing observed and simulated monthly values

[‡]EF = Nash-Sutcliffe modelling efficiency comparing observed and simulated monthly values

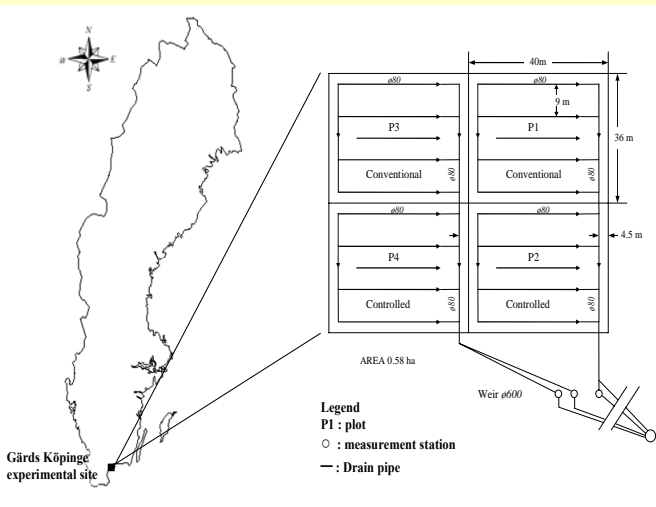


Figure 1. Location of the Gärds Köpinge experimental site in south-east Sweden and field layout (Wesström 2006).

In this study simulations were ran between January and December 2004 (36 months). The model was evaluated by comparing predicted results with measurements of outflow and NO₃-N losses from subsurface drains.

Conclusions

Our results showed the potential of DRAINMOD-N II for predicting NO₃-N losses from drained lands under cold conditions in South-east Sweden.

References

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- Youssef, M.A., Skaggs, R.W., Chescheir, G.M., Gilliam, J.W. 2005. The nitrogen simulation model, DRAINMOD-N II. Trans. ASAE 48(2): 611-626.