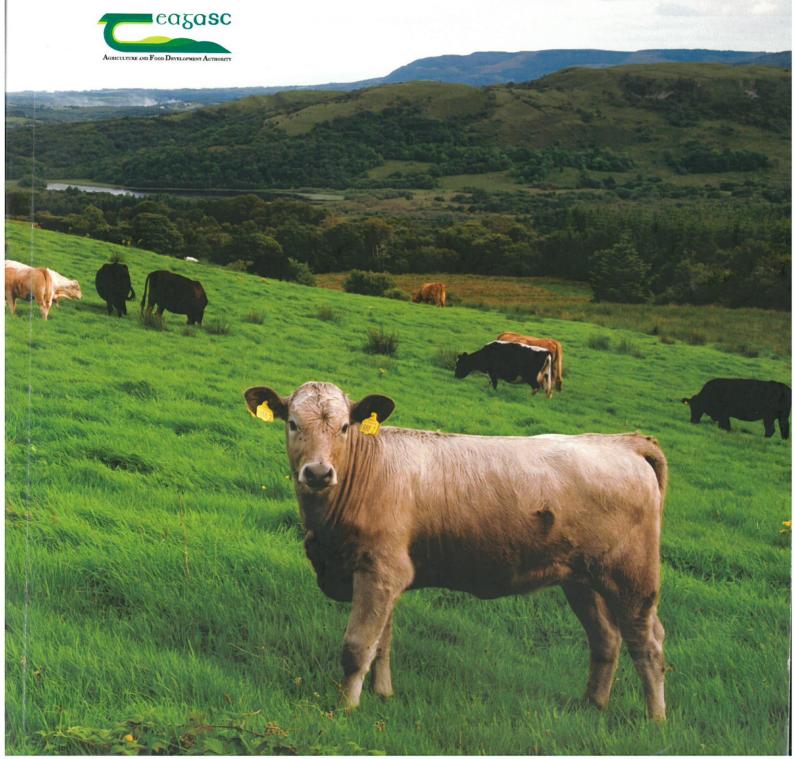
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# The effect of winter crops and crop residue management on nitrate leaching during winter

Karoline D'Haene<sup>1,2</sup>, Jeroen De Waele<sup>3</sup>, Joost Salomez<sup>4</sup>, Georges Hofman<sup>2,3</sup>, Stefaan De Neve<sup>3</sup> <sup>1</sup>Plant Sciences Unit - ILVO, Merelbeke, Belgium, <sup>2</sup>Research and Extension Advisory Board on Sustainable Fertilisation, Merelbeke, Belgium, <sup>3</sup>Department of Soil Management - Faculty of Bioscience Engineering - UGent, Gent, Belgium, <sup>4</sup>Department of Environment, Nature and Energy - Flemish Government, Brussels, Belgium

**Background & Objectives** 

Nitrate (NO₃-) leaching from farmland remains the predominant source of nitrogen (N) loads to ground- and surface waters. As residual soil mineral N (RSMN) content at harvest is often high and may increase by mineralisation from crop residues and soil organic matter, it is critical to understand which post-harvest management measures can be taken to restrict NO<sub>3</sub>- leaching.

#### Materials & Methods

We simulated "worst-case" and alternative post-harvest management scenarios with the EU-rotate\_N model [1]. The simulations started at a given RSMN content after applying the Flemish maximum allowed N fertilisation rates. Monte Carlo simulation were performed to assess the combined effect of variability in RSMN and weather conditions on NO<sub>3</sub>- leaching [2]. We evaluated the different scenarios by comparing the mean  $NO_{3}$ - concentration after dividing the simulated  $NO_{3}$ - concentration at 90 cm by various values to include natural attenuation processes [3].

#### **Results & Discussion**

Monte Carlo simulations showed that RSMN and attenuated mean NO<sub>3</sub>- concentration (ANCatt) were positively correlated for most scenarios and that the variability in ANCatt due to different weather conditions increased with higher RSMN. In the worst-case scenarios, the simulated ANCatt was lowest for cut grassland, intermediate for winter wheat, sugar beet and silage maize and highest for potatoes and lower for a silt loam than sandy soil. All of the simulated measures (catch or cash crop and crop residue management) significantly reduced the NO<sub>3</sub>- concentration in the leaching water. For crops which are harvested late, the potential management measures are limited. Especially potatoes are a problem crop because of the high RSMN values. Undersowing grass in silage maize and removing N rich crop residues are promising options. The number of scenarios with an ANCatt complying with the Nitrates Directive depends on the local attenuation factor [2].

#### Conclusion

The NO<sub>3</sub>- concentration was significantly reduced by the simulated measures. Regions with a small attenuation factor will require site specific plans with preconditions for specific crops or adaptation of crop rotations. A well-balanced crop combination on a subcatchment level is essential to achieve good groundand surface water quality.

### Acknowledgement

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