Measurement of nutrient leakage from organic crop rotation in Finland

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Abstract

Water discharge and nutrient leakage studies were conducted in an experimental field on organic farming practices for 20 years. Water discharge was measured and flow-weighted water samples were taken from mixed crop rotation.

Keywords: water discharge, nutrient leakage, crop rotation, drainage flow

Introduction

Organic production may reduce nutrient leakage because of low external inputs of nutrients and high internal recirculation. There is, however, a risk of high losses from organic fertilizers, e.g. farmyard manure and legume biomass (Ylivainio et al., 2002). Few direct measurements have been made of nutrient leakage in organic agriculture in Finland.

Methods and preliminary results

Water discharge from drainpipes was measured from organic crop rotation since January 2005. The experimental field is located on a moraine soil in Juva, eastern Finland (61°53' N, 27°53' E). Organic farming practices were followed since 1985. The crop rotation (5.87 ha) is consisted of spring cereal and grass seeds (1st year), grassland (2nd), grassland (3rd), winter cereal (4th), green manure (5th), and spring cereal (6th). One of the plots was not included in the drainage measurement area of 4.87 ha. Approximately 30 t/ha cattle sludge was spread on the 1st year plot which equals about 0.3 LU/ha for the whole crop rotation per year. Harvested grain yields as net yields amounted to about 2,000 kg DM/ha and grass yields to about 6,000 kg DM/ha. Water discharge was measured automatically and flow-weighted water samples were taken manually once a day to once a week. The water samples will be analysed for both total and soluble nitrogen and phosphorus particles, total solids, pH and conductivity.

The first water discharge results from January to April are now available. The water flow was almost constant but minimal (< 0.1 l/s) throughout the winter. The spring flow occurred in April with a maximum flow of about 6 l/s and total flow of about 4,000 m^3 or 80 mm.

Conclusions

The organic farming practices were applied in the experimental field during 20 years and the soil profile was undisturbed since drainage in 1989. The aim of the farming practices is to maintain the productivity of the area, and the steady-state assumption is valid.

References

Ylivainio, K., Esala, M. and E. Turtola (2002). Luonnonmukaisen ja tavanomaisen viljelyn typpi- ja fosforihuuhtoumat, Kirjallisuuskatsaus. (Nitrogen and phosphorus leakages on organic and conventional farming, Literature review.) Maa- ja elintarviketalous 12. MTT, Jokioinen, 74 pp.