



The seasonal impacts on nutrient retention in two constructed wetlands in Latvia

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Surface and subsurface flow constructed wetlands are established to improve water quality in agricultural areas. This study includes water quality monitoring data collected since June, 2014 at the Mezaciruli Farm located in the Zalenieki District in Latvia. As the study site is located in the climate zone where air temperature during the winter period is below 0°C on average 51 days per year during the time period of 2014 – 2017, the treatment efficiency of two wetlands in different seasons was compared. The average air temperature at the meteorological station located nearby in Dobeles was 8.6°C during the vegetation period (April to September) and 7.7°C during the non-vegetation period (October to March).

Efficiency of the constructed wetlands to retain nutrient compounds was determined by comparing nutrient concentrations at the inlet and outlet of the wetland. In order to detect the seasonal impact, monthly mean nutrient retention values were compared. The surface flow constructed wetland was capable to reduce the concentrations of total nitrogen on average by 16%. The seasonal impact on nitrogen transformations in surface flow constructed wetland is demonstrated by increase of ammonia-nitrogen concentrations and decrease of nitrate-nitrogen concentrations during the vegetation period. The subsurface flow constructed wetland showed a steady decrease of total nitrogen throughout the year by 34% and treatment efficiency of nitrogen compounds is less affected by seasonal changes in air temperature.

During the study period the retention efficiency of surface flow constructed wetland for total phosphorous was 53% higher during the vegetation period. Several cases showed an increase of orthophosphate-phosphorous and total phosphorous during the non-vegetation period. The subsurface flow constructed wetland showed a steady decrease of orthophosphate- phosphorous and total phosphorous by 83% and 82%, respectively, throughout the study period, with a potential to retain total phosphorous more efficiently during the vegetation period.

The surface flow constructed wetland retained suspended solids by 58%. An increase in suspended solids after the wetland during March, April and May was detected, which is related to occurrence of spring flood. The subsurface constructed wetland detained suspended solids by 59% and showed episodic concentration increase during the non-vegetation period.

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