Aalto-yliopisto
Insinööritieteiden korkeakoulu

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Subsurface drainage can help in managing field nitrogen leaching

Name of the doctoral dissertation	Assessing the effects of subsurface drainage on hydrology and nitrogen transport in Nordic fields (Salaojituksen vaikutus pellon hydrologiaan ja typen kulkeutumiseen pohjoisilla alueilla)
Contents of the dissertation	As the current field drainage systems are aging, there is an increasing need for drainage improvements to restore the efficiency of the old systems. Subsurface drainage is the primary water management method in field cultivation and has an impact on the loading routes of nutrients, such as nitrogen, that are transported with water. Most of the nitrogen load occurs outside the growing period when crops are not using the soil nitrogen storages. This is also the most critical time for field drainage because the crop water uptake is minimal. The study examined how the factors affecting the functioning of subsurface drainage methods influence the field drainage state and the nitrogen transport. The results demonstrated that differences in drainage performance due to the drainage installation method were small compared to other factors such as soil characteristics and the installation of additional drains. Subsurface drainage was found to change water flow pathways below the drainage depth and these deep flow pathways should be taken into account as one leaching route. Without the implementation of subsurface drainage, a greater share of the field nitrogen load may originate through groundwater outflow. A comprehensive understanding of loading routes and the factors affecting them is essential when planning measures to control the nitrogen load. During the study, a three-dimensional solute transport model was developed to investigate this problem.
Field of dissertation	Water and environmental engineering, water resources management
Doctoral candidate	Heidi Salo, Master of Science (Technology) Born in Espoo in 1988
Date and time of dissertation	11 October 2019, at 12 pm
Place	Aalto University School of Engineering, Computer Science building, Hall T2, Konemiehentie, Espoo
Opponent	Katri Rankinen, D. Sci. (Tech.), Finnish Environment Institute
Custos	Professor Harri Koivusalo, Aalto University School of Engineering, Department of Built Environment
The dissertation is available online at	https://aaltodoc.aalto.fi/handle/123456789/40518
Contact information for the doctoral candidate	Heidi Salo, Tietotie 1 E, Espoo Tel. + 358 505975295, heidi.salo@aalto.fi

The dissertation is available to the public on the notice board of the office master at the Aalto University School of Engineering (Otakaari 4).