Nitrate Losses in Drained Paddy Fields during Rice and Canola Growing Seasons

S. DoustiPashakolaee, A. Shahnazari¹ *, and M. Jafari Talukolaee
M.Sc. student of Irrigation and Drainage Engineering, Sari Agricultural Sciences and Natural Resources University.
dostipasha@yahoo.com
Associate Professor, Water Engineering Department, Sari Agricultural Sciences and Natural Resources University.
aliponh@yahoo.com
Ph.D. student of Irrigation and Drainage Engineering, Sari Agricultural Sciences and Natural Resources University.
mehdijafari_89@yahoo.com

Abstract

Subsurface drainage is a prerequisite to growing winter crops and improving water management in rice season in the consolidated paddy fields in Northern Iran. Based on different cultivation condition, to decrease nutrient loss from subsurface drainage in these fields, adopting suitable strategies will decrease the pollution of water resources. A research was conducted in pilot farm of Sari Agricultural Sciences and Natural Resources University from May 2015 to April 2016 (during two successive rice-canola growing seasons) to evaluate the effect of subsurface drainage systems on nitrate loss and nitrate concentration in different soil depths. The subsurface drainage treatments were three existing subsurface drainage systems with mineral envelopes, including systems with 30-m spacing and 0.9 m depth, a drainage system with 30-m spacing and 0.65 m depth, a drainage system with 15-m spacing and 0.65 m depth, and a bi-level subsurface drainage system with drain spacing of 15 m and drain depths of 0.65 and 0.9 m as alternate depths (bi-level). The nitrate concentration was monitored in drainage water and at depths of 0.4, 0.9, 2 and 5 m during the study period. The results showed that the nitrate concentration and the total nitrate loss during rice growing season was 33-80% and 91-99 %, respectively, less than that in canola growing season. Also, the nitrate concentration in drainage water for drains with 0.9 m depth was more than that in drains with 0.65 m depth. On the other hand, nitrate concentration in surface depth was higher than lower depths in all treatments. Overall, in both seasons, drainage system with wider spacing and shallower depth drained out less nitrate than the other systems.

Keywords: Drain depth, Drain discharge, Drain spacing, Piezometer, Soil depth.

---

1 -corresponding author: Sari- Water Engineering Department, Sari Agricultural Sciences and Natural Resources University
* - Received: November 2016, and Accepted: February 2017