

Monitoring and modeling of nitrogen leaching caused by nitrogen fertilizer application to green tea fields in Japan

Y. Hirono¹, S. Nakamura², T. Sano¹, and K. Nonaka¹

1. National Agriculture and Food Research Organization (NARO), Japan.

2. Shizuoka Prefectural Research Institute of Agriculture and Forestry, Japan



Background

1970s ~

Large amounts of nitrogen fertilizer was applied to tea fields.

→ Nitrate leaching, nitrous oxide emissions,
and soil acidification

In the late 1990s ~

The amount of fertilizer applied has been reduced to address these problems.

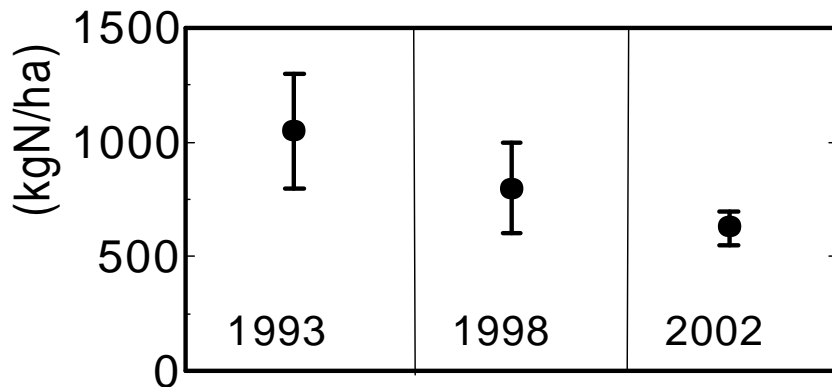


➤ The objectives of this study is:

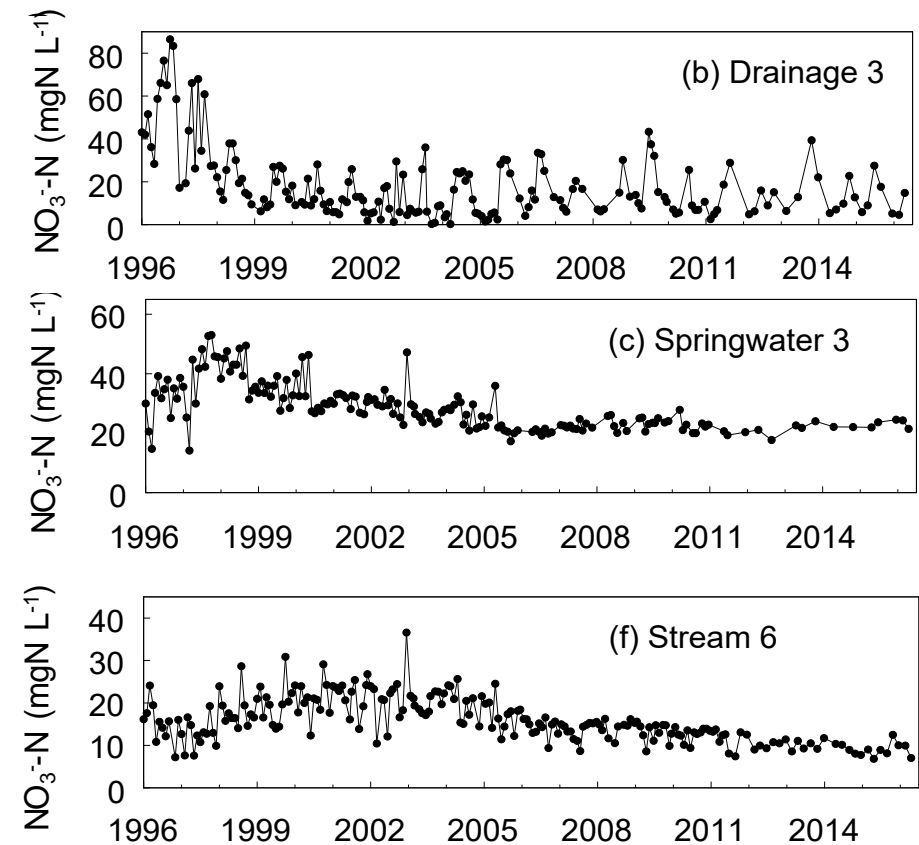
- (i) To reveal how the reduction of N use influences local water quality.
- (ii) To model the N leaching from green tea fields.

Changes in $\text{NO}_3\text{-N}$ concentrations in water systems around an intensive tea-growing area

- $\text{NO}_3\text{-N}$ concentrations successively improved in the first decade of the study by reduction of N input to tea fields.
- The $\text{NO}_3\text{-N}$ concentration changes at drainage and spring water sites reach a steady state in the second decade because the fertilizer application rates leveled off in this area.



Changes in annual N application rates in green tea fields.

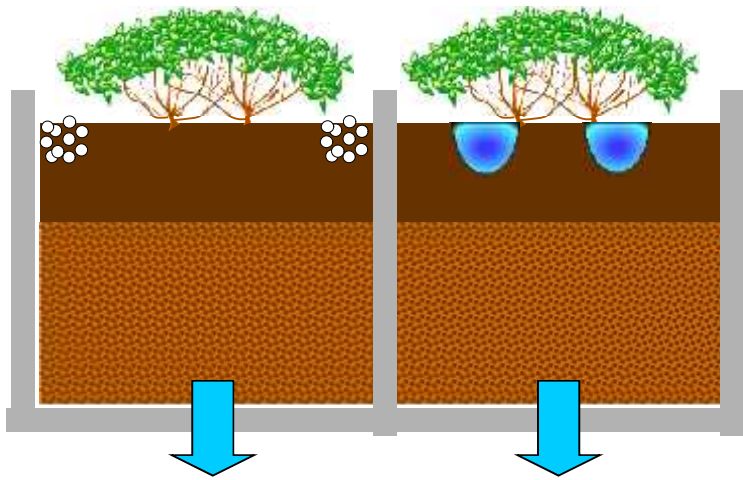


Modeling of N leaching from green tea fields

➤ Lysimeter experiment

Methods of fertilizer application

Conventional Fertigation



The amount of leachate
 $\text{NH}_4\text{-N}$ and $\text{NO}_3\text{-N}$ concentrations

➤ Simulation using one dimensional water and solute transport model (HYDRUS-1D, Šim nek et al., 2013)

