

NITRATE DISTRIBUTION IN SOIL SOLUTION UNDER N FERTILIZATION

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The pollution of groundwater in areas of high agricultural activity is a consequence of farming practices using large quantities of fertilizers and pesticides. The impact of these practices on the pollution of groundwater in Europe has been demonstrated by Scheperz et al. (1995).

In Hungary, studies of the contamination of aquifers by nitrates originating from farming practices have been carried out in the Great Hungarian Plain (Szucs, 1984; Szucs & Mansell, 1992; Nemeth, 1996). In this region nitrogen-based fertilizer residues left unused by plants may be leached away, contaminating groundwater. This contamination may occur several days or even months after the fertilizers have been spread. The speed at which the contamination occurs depends on the nitrogenous compound concentration and on the fertilization techniques. The leaching of soil nitrate has been made evident in areas with heavy precipitation and in areas with a dryer climate where intensive irrigation is used (Koumanov et al., 2001; Sanchez-Perez, 2003).

The objective of this study was to measure the nitrate concentration of soil solution under N fertilization. Treatments included three N rates (N50%=81, N100%=162 and N150%=243 kg ha⁻¹) injected into the water and one soil application (N100%S=162 kg ha⁻¹).

The nitrate concentrations in the soil solution are reported on Fig. 1 and Fig. 2. The nitrate levels in soil solutions were different in all treatments. After the first application of fertilizer (10 days after planting), nitrate concentrations varied between 77-149 mg NO₃⁻ l⁻¹ in fertigation treatments, while the value of nitrate concentration increased by 332 mg NO₃⁻ l⁻¹ in conventional N application treatment. This trend continued during the study period. The maximum nitrate concentrations in soil solutions were observed on 31. day after planting, concentrations increased to 515 mg NO₃⁻ l⁻¹. Lower nitrate concentration was observed at 50 cm soil layer in fertigation treatments such as at 30 cm soil layer.

It was observed, that the nitrate concentration of soil solution was increased under conventional fertilization. The lowest nitrate levels occurred in fertigation treatments.

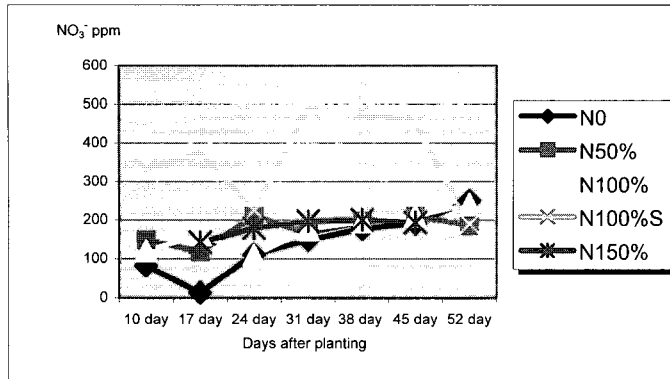


Fig. 1 The nitrate content of soil solution, from the depth of 30 cm.

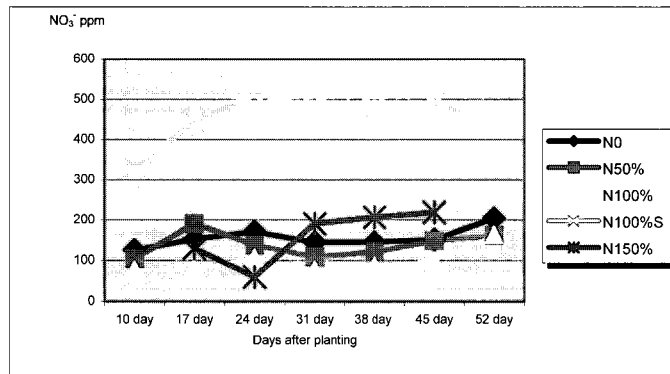


Fig. 2 The nitrate content of soil solution, from the depth 50 cm.

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