Chapter 4

Water Percolation: An Indicator of Nitrogen-Leaching Potential

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The amount of water that percolates through and below a crop’s root zone is important in determining the amount of nitrate (NO₃) leached. Several important soil, crop, and climatic factors interact to affect the amount of percolation. The roles of some of the most important factors are outlined here. Later in the chapter, percolation amounts simulated with the Erosion-Productivity Impact Calculator (EPIC) model (Williams et al., 1984) will characterize the average percolation and the variation in percolation at several important agricultural locations around the USA. Knowledge of this variation in percolation helps to evaluate the leaching potential at these locations.

4-1 MAJOR SOIL, CROP, AND CLIMATIC FACTORS AFFECTING PERCOLATION

4-1.1 Characteristics of Soil Water

The amount of water that percolates from soil is determined in part by the balance between gains in soil water by rainfall or irrigation and losses from the soil water storage reservoir from crop water use and evaporation. For simplicity, we will characterize soil water by representing the soil as a storage barrel for water made up of different compartments (Fig. 4-1). The entire capacity of the barrel represents the total water that may be contained in the soil profile to a depth from which crops extract water.

Water stored by soil varies greatly in the amount of energy required to remove it from soil. Gravitational force causes water to percolate from the soil when the water content is between saturation (all soil pores are filled...