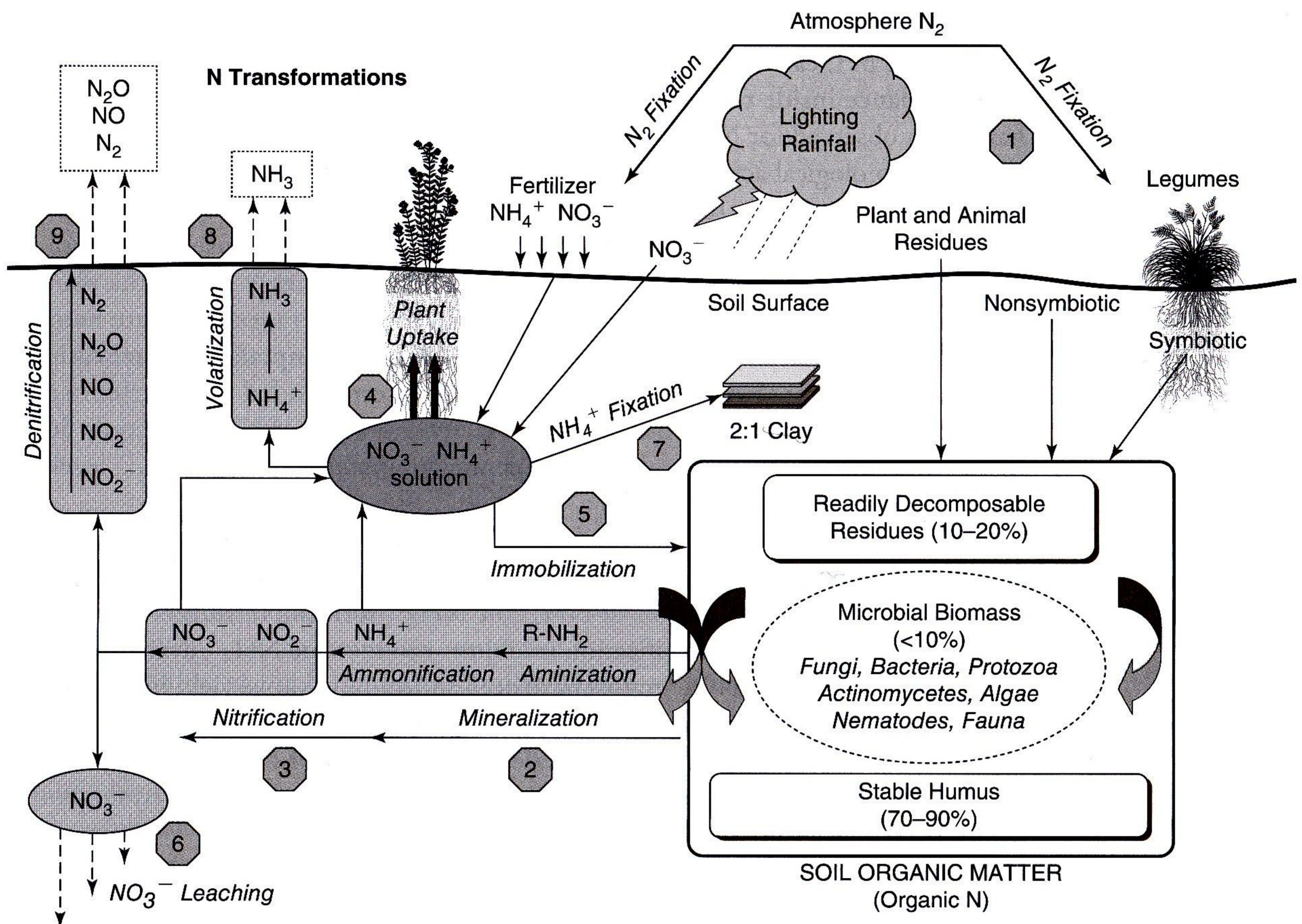


Nitrogen cycle in soil



Most of the N transformations are facilitated by the microbial biomass and cycle through the organic fraction in soil.

- in step 1, N in plant and animal residues and N derived from the atmosphere through electrical discharges, legumes and industrial processes (N₂ is combined with H₂ or O₂) are added to the soil,
- in step 2, organic N is mineralized to NH₄⁺ by soil organisms,
- much of the NH₄⁺ is converted to NO₃⁻ by bacteria through nitrification (step 3),
- in step 4, NO₃⁻ and NH₄⁺ in soil solution are taken up by plant roots,
- in step 5, some solution NH₄⁺ and NO₃⁻ are converted back to organic N through immobilization,
- solution NO₃⁻ can be lost by leaching to groundwater or drainage systems as a result of downward movement below the root zone in percolating water (step 6),
- in step 7, NH₄⁺ fixation by 2:1 clay minerals can occur,
- in step 8, NH₄⁺ can be volatilized to gaseous NH₃,
- NO₃⁻ derived from nitrification, fertilization, or rainfall can be converted by denitrifying bacteria to N₂, N₂O, NO that escape into the atmosphere (denitrification; step 9), completing the cycle.

Havlin, J. L. et al. (2014): *Soil Fertility and Fertilizers: An Introduction to Nutrient Management*, 8th ed., Pearson, 516 p.

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