

## 8) Fast soil solution nutrient and water dynamics in top- and subsoil

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### Introduction

The weekly measurement of soil water suction and the monthly measurements of soil solution nutrient contents were supplemented by high resolution determinations of soil water and nutrient fluxes. With these measurements, we want to find out the short-term dynamics of applied fertilizer.

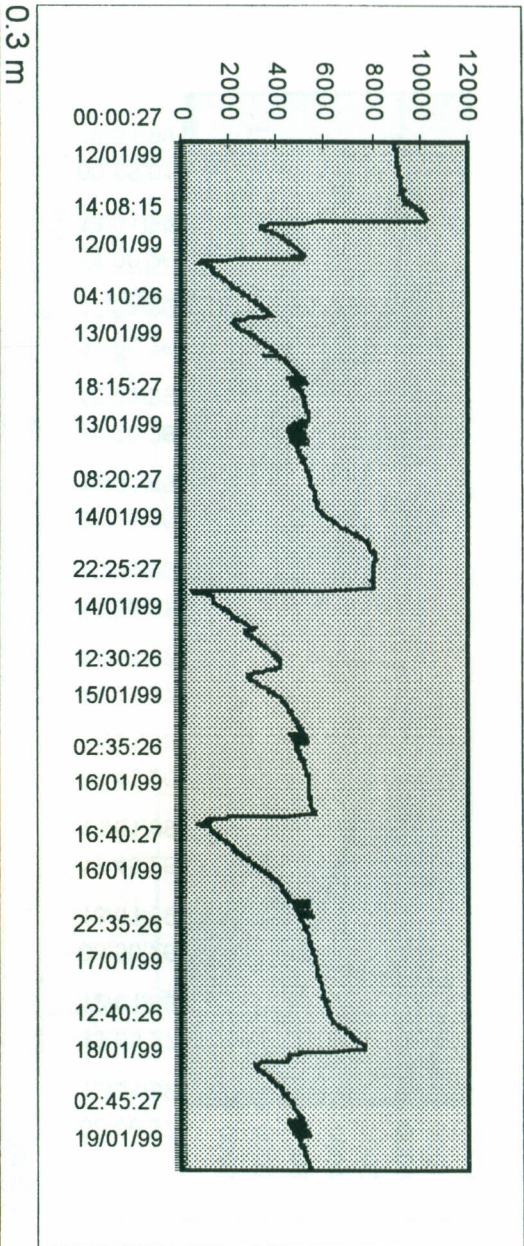
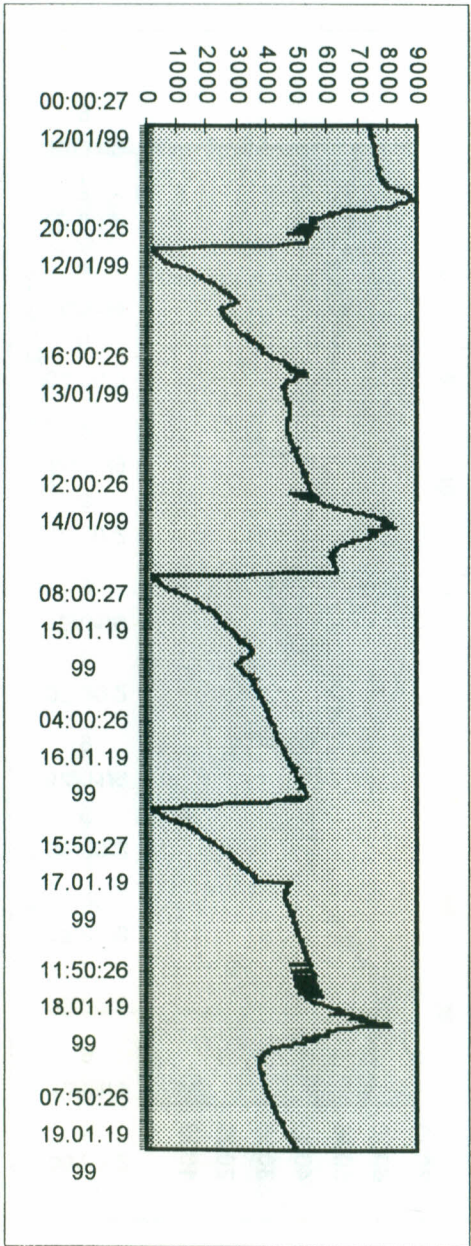
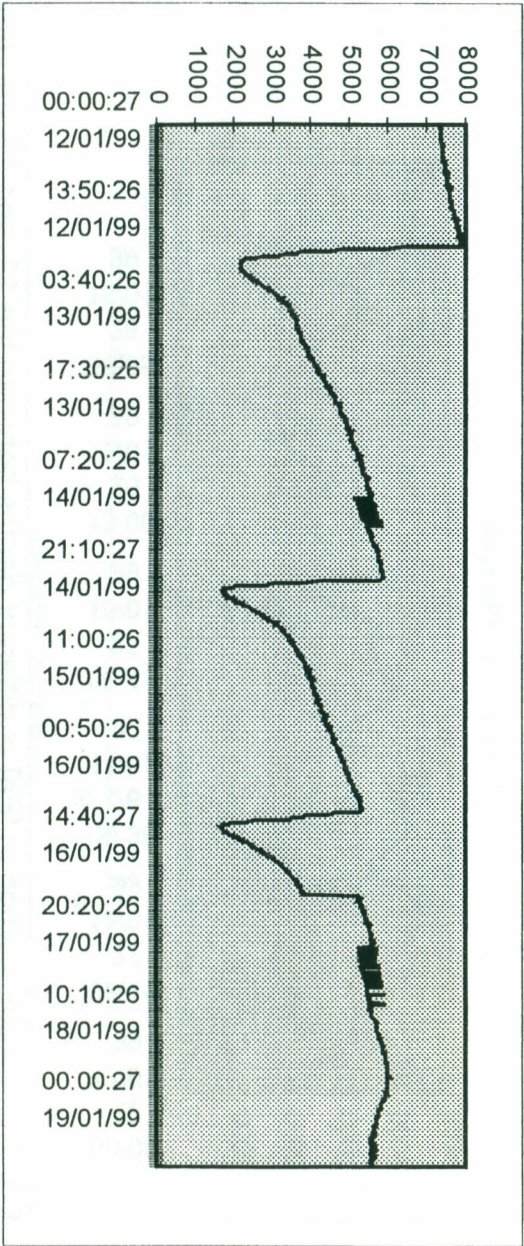
### Methods

In a soil pit a data logger system connected to tensiometers and TDR was installed up to a depth of 3.5 m under pueraria in an agroforestry system with *Theobroma grandiflorum* (cupuacu); *Bactris gasipaes* (peach palm); *Bertholletia excelsa* (castanho); and *Bixa orellana* L. (urucum) with a cover crop of *Pueraria phaseoloides* (experimental design see Fig.2 in annex 6). The instruments were installed between cupuacu and pupunha under pueraria. Readings were done every 5 min during the first month, every 15 min thereafter. Suction cups were inserted up to a depth of 5 m under pueraria, cupuacu and pupunha. Solution was extracted by continuous vacuum application with a portable pump. Samples were gathered in dark glass bottles and collected weekly. Nitrogen analyses were done on a multi-flow analyser (Skalar). A combined fertilizer (ammoniumsulfate, TSP and micronutrients) was applied in mid January around the tree stems.

### Results

After a rainfall event, the soil water suction at 0.1 m depth increased immediately (Fig. 1), and fast responses were seen even up to a depth of 0.9 m. This result may indicate that nutrients may be leached very fast even in these soils with high clay contents. The N concentrations in the soil solution relevantly increased at 0.1 m depth during the same time period (Fig. 2), as shown for *Bactris*. First, the ammonium concentrations increased, but nitrate contents followed rapidly indicating a fast nitrification in the studied soils.







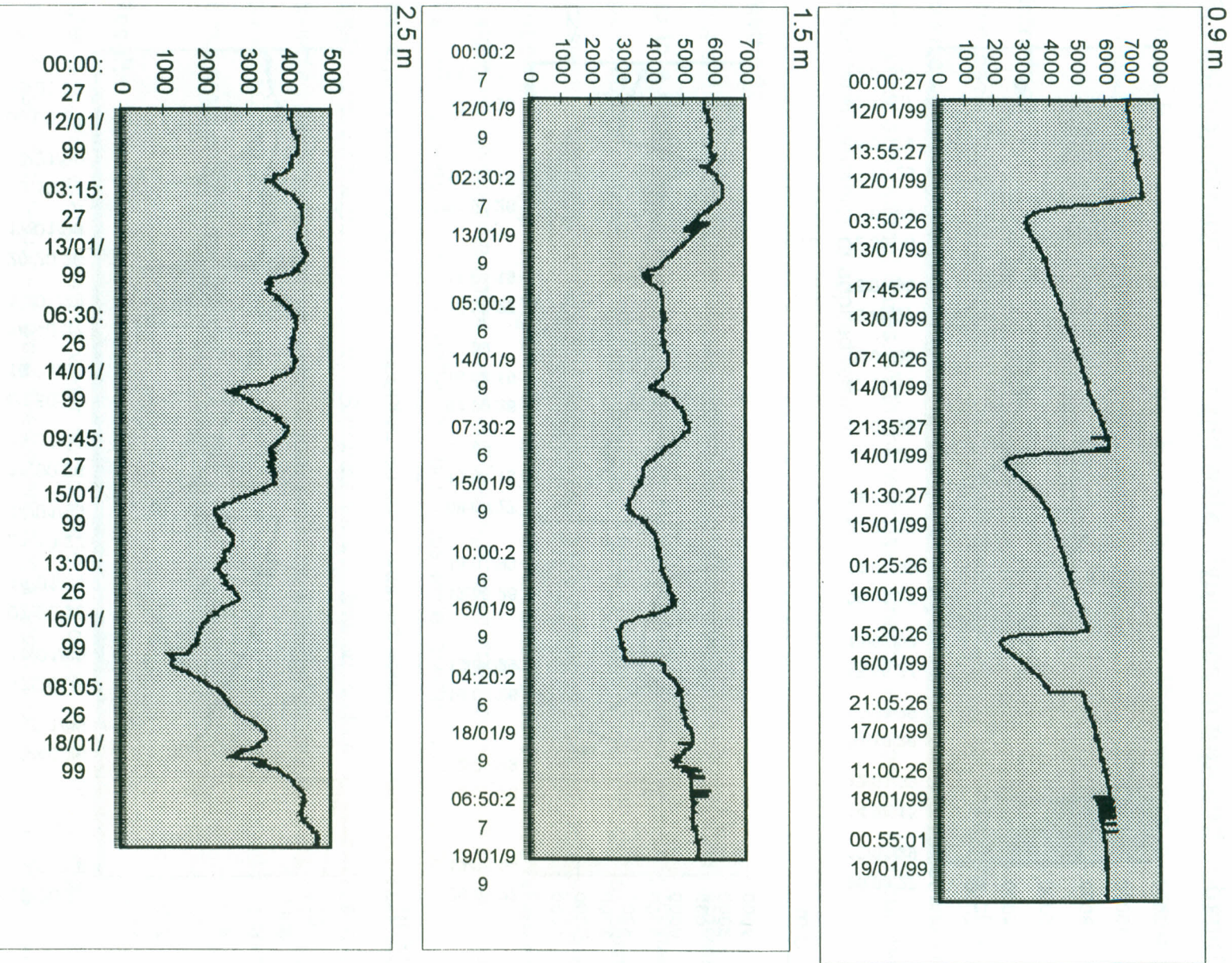


Fig. 1 Soil water suction in [Pa] at different depths between the 12. and 19. January 1999.



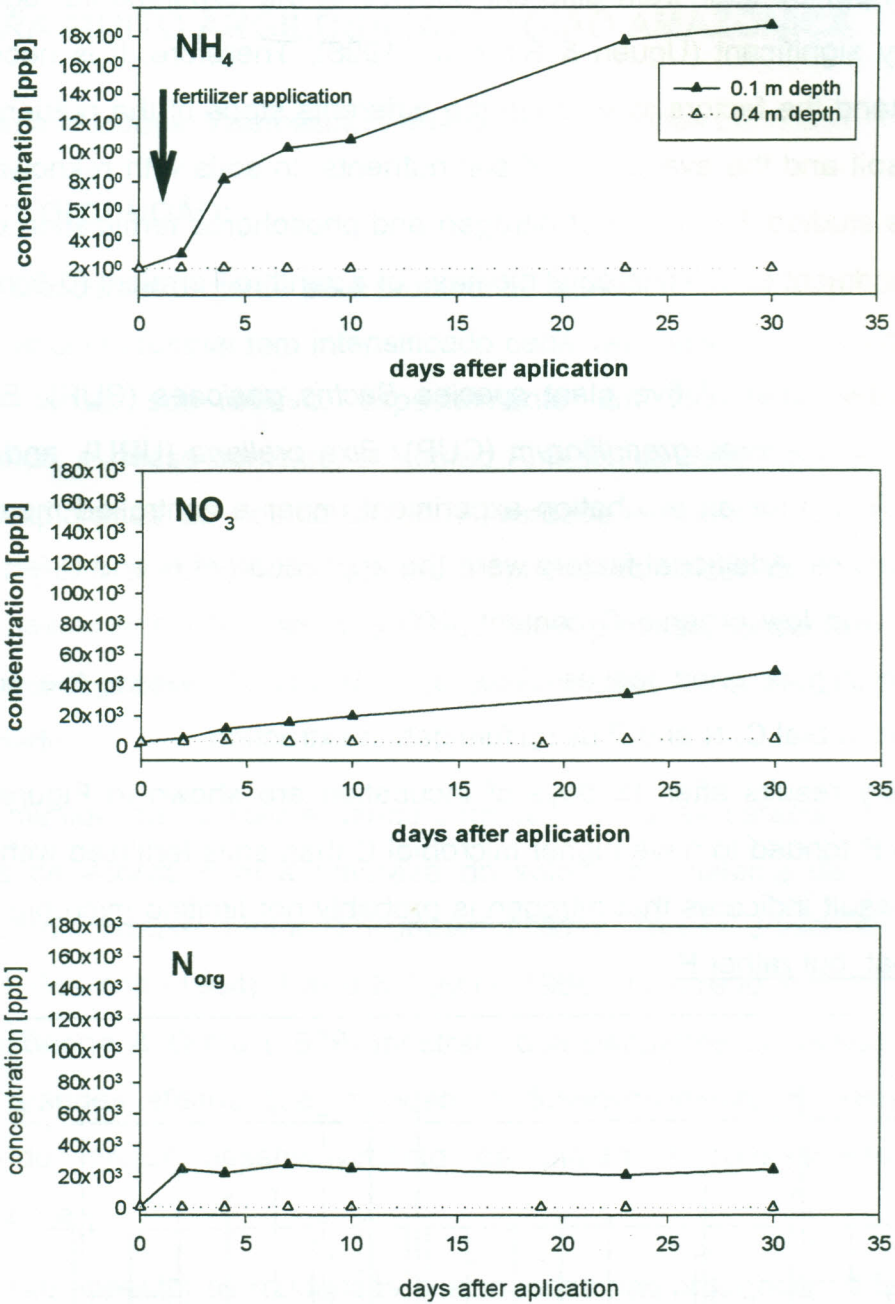


Fig. 2 Ammonium, nitrate and organic N dynamics in the soil solution at 0.1 and 0.4 m depths under *Bactris gasipaes*.