

Neotropical Ecosystems



WAVES

Water Availability, Vulnerability
of Ecosystems and Society
in the Northeast of Brazil

Proceedings of the
German-Brazilian Workshop
Hamburg, 2000

edited by
Reinhard Lieberei
Helmut Bianchi
Vera Boehm
Christoph Reisdorff

Editors

Reinhard Lieberei ¹, Helmut K. Bianchi ², Vera Boehm ¹, Christoph Reisdorff ¹

¹ Universität Hamburg, Institut für Angewandte Botanik, Ohnhorststr. 18, 22609 Hamburg, Germany

² GKSS-Forschungszentrum Geesthacht GmbH, Max-Planck-Straße 1, 21502 Geesthacht Germany

Layout

Helmut K. Bianchi, GKSS, Karsten Bittner, Documedia, Geesthacht, Germany

Printing

GKSS-Forschungszentrum Geesthacht GmbH, Geesthacht, Germany

ISBN 3-00-010691-X

Lieberi, R., Bianchi, H-K., Boehm, V., Reisdorff, C., (eds.) 2002:
Neotropical Ecosystems, Proceedings of the German-Brazilian Workshop,
Hamburg 2000. GKSS-Geesthacht .

The publishers give permission to copy single contributions from the Proceedings for personal use exclusively. Copies may be passed on only with the correct specification of the source.

The research cooperation has been carried out under the auspices of the German - Brazilian Governmental Agreement on the Cooperation in Scientific Research and Technological Development.

The issuance of the Proceedings and the production of the CD-ROM was sponsored (Code 0339991) by the



**Federal Ministry of
Education and Research**

The responsibility for the contents of the contributions is solely the authors'.

Nutrient Dynamics in Soil Solution after Fire-free Land Preparation in Eastern Amazonia

Kato, O.R.¹, Kato, M.S.A.¹, Möller, M.R.F.¹, Denich, M.³, Fölster, H.² and Vlek P.L.G.³

¹ Embrapa Amazônia Oriental, Belém-PA-Brazil

²University of Göttingen - Germany

³ ZEF-University of Bonn, Bonn, Germany

1 Introduction

The nutrient dynamics in the soil cultivated with the slash-and-mulch system are different from the areas cultivated with slash-and-burn system, due to absence of the rapidly nutrients available into the soil coming from the ashes. The objective of this study was to evaluate the methods of land preparation on the dynamics of nutrients in the soil solution in cultivated area with slash-and-mulch system. This approach is connected with the substitution of the slash burning by mulch techniques in Amazonian fallow systems. The field experiment was conducted in small holder farm in the municipality of Igarapé Açu, PA, Brazil. The treatment were burning (SB) and mulching with chopped vegetation (SM). The Soil solutions were collected in suction probes placed at the a depth 40 cm for each treatment. The sampling intervals was of the 15 days.

2 Results

The $\text{NH}_4\text{-N}$ concentration were low in soil solution, showing the higher values (2.6 Mg l^{-1}) in the initial phase, after first land preparation, beginning of cultivation of rice (Fig. 1)

In the burned areas, the $\text{NO}_3\text{-N}$, K and Ca concentrations in the first cropping period were higher after land preparation and beginning the crop cultivation. It decreased rapidly until the end of the rice and cassava cultivation (Fig. 1 and 2). In the second cropping period the concentrations of $\text{NO}_3\text{-N}$ and Ca presented the same tendencies observed in the first cropping period, even so the K concentrations were low in the second cropping period.

In the mulched areas the $\text{NO}_3\text{-N}$, K and Ca concentrations in the first cropping period were higher during the cultivation phase of the cowpea/initial cultivation phase of the cassava. Was observed also, that with time the nutrients concentrations in the mulched area increased when comparing to burned area.

All above mentioned nutrients had very low concentrations in the second year, when there was merely cassava and later in the beginning of fallow. Considering only at concentrations, and treatment differences can be observed mainly the beginning, right after land preparation by SB and SM respectively when, either decomposition processes or water conservation by the mulch layer play a role. $\text{NO}_3\text{-N}$ started showing different dynamics in SB and SM onset of the dry season in July, which due to the counteraction of the largely

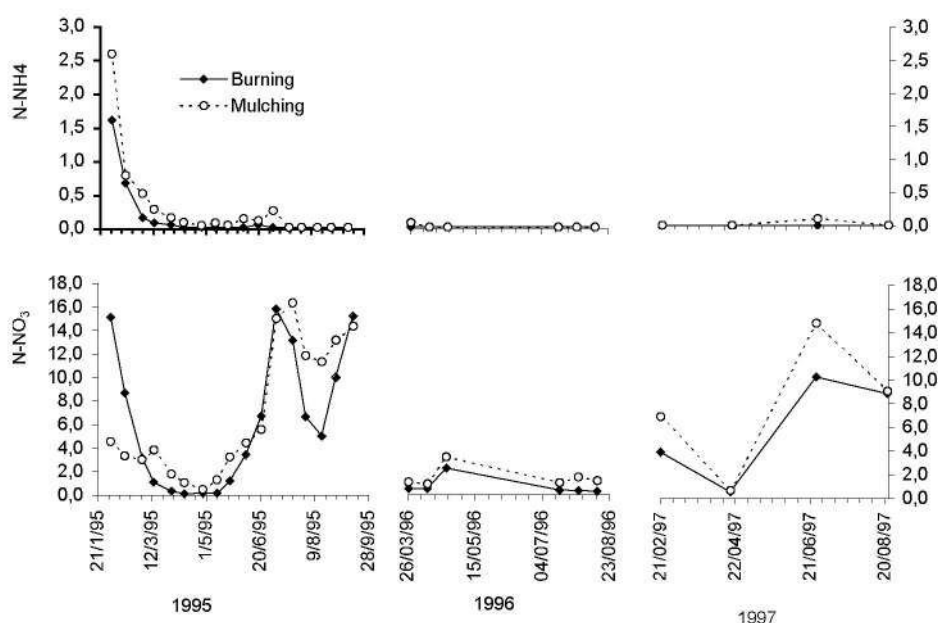


Fig. 1. Mineral N concentration in the soil solution at 40 cm depth

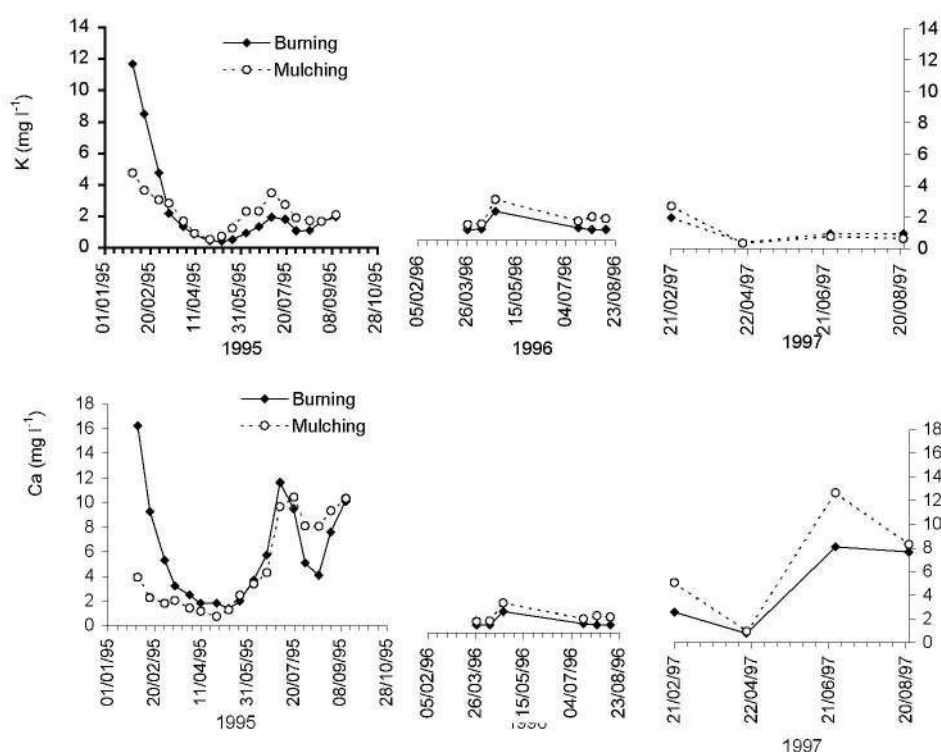


Fig. 2: Potassium and Calcium concentration in the soil solution at 40 cm depth

decomposed organic matter of the mulch layer (contributing to high concentrations by N-mobilization) with the water conserving impact of the mulch layer (contributing to low concentrations by N-dilution) making it difficult to draw conclusions, when comparing to SB.

3 Conclusion

- The greater nutrient availability coming from the ashes in burned plots, led to greater nutrients losses for leaching at the depth 40cm of soil after land preparation.
- In the mulched plot the nutrients losses increased with the time, showing the slow nutrients release of the mulch from the organic matter decomposition.
- The nitrogen leaching occurred almost, exclusively in the nitrate form, independent of the land preparation method.