Interaction of Arbuscular Mycorrhizal Fungi with the tropical grass *Brachiaria humidicola* with special emphasis on the phenomenon of Biological Nitrification Inhibition

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Abstract

Nitrogen pollution is a major issue in modern agriculture. Control of nitrification in soils potentially has a large impact to reduce N losses from agroecosystems. Since the discovery of substances released by plants in naturally low nitrifying ecosystems the term of Biological Nitrification Inhibition (BNI) has been coined. *Brachiaria humidicola* is often used as a model crop for research in this field.

This pot trial experiment with three soils form the Llanos region (Colombia) investigated a possible role of Arbuscular Mycorrhizal Fungi (AMF) in a N-fertilization experiment with three genotypes of *B. humidicola* with contrasting BNI activity. AMF were quantified by root staining, the quantification of AMF by qPCR from freeze dried root samples did not work, however freshly collected root samples did yield results. PCR protocols for two set of primers were used.

No correlation of mycorrhization with plant available P (Bray 2 and Mehlich 3) was found and neither a difference between the genotypes was found. Plants growing the high clay soil showed a significant higher ($p<0.05$) mycorrhization than for the sandier soil. The high in vitro BNI potential of genotypes was not reflected in lower nitrate values in soil or soil percolate.

The experiment was irrigated with highly carbonated water for one year which strongly distorts the pH value with no zero control or baseline measurements being available. This makes meaningful conclusion from this trial difficult. More research is needed to reveal the role of mycorrhiza in the BNI phenomenon and in situ studies over a wide variety of soils are needed to prove the effectiveness of BNI.

The role of *B.humidicola* in the reduction of greenhouse gas emissions in tropical pasturing is very questionable as reductions in nitrous oxide only play a miniscule role compared to methane emissions by cattle. Development of other high BNI crops such as wheat or sorghum may have a stronger impact in reducing emissions than *B. humidicola*.