

Genetic diversity of arbuscular mycorrhizal fungi in a mixed forest in the semi-arid region of Minas Gerais- Brazil.

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Introduction

Arbuscular mycorrhizal fungi (AMF) improve water relations and nutrient supply for plants, increasing tolerance to water stress and survival (Allen, 1991). Also, AMF transfer immobilized nutrients (P, Zn, Cu) in soil (Smith & Read, 1997) or in organic matter (Hodge et al, 2001) to plants. Using PCR-denaturing gradient gel electrophoresis (DGGE), the genetic diversity of the AMF community of a mixed forest with Brazilian *Caatinga* species and *Eucalyptus* sp. was assessed within the scope of the Jaíba Project in the NE of Minas Gerais-Brazil. This mixed plantation was implanted in a typical degraded area occupied by invasive *Carrasco* vegetation, the purpose being to supply wood for local communities so as to avoid their extraction in the protected areas (Preserved Area) as an experimental model to study the restoration of these areas.

Methodology

The present study was carried out on 4 experimental sites differentiated by their floristic composition. Treatments were: 1- Monoculture of native species; 2- Native species inoculated with AMF and Rhizobio (**); 3- Monoculture of *Eucalyptus* sp.; 4- Monoculture of *Eucalyptus* sp. inoculated with AMF(*); 5- Mixed-species plantation of *Eucalyptus* with a N-fixing species and 6-treatment 5 inoculated(**). Preserved (P) area and *Carrasco* (C) were control areas. Inoculation was done with 100 AMF spores/sp (*Gigaspora margarita*, *Glomus* sp). Vegetal species were: *Anadenanthera peregrina*, *Plathymentia reticulata*, *Enterolobium contortisiliquum*, *Schinopsis brasiliensis*, *Tabebuia* sp, *Myracrodruon urundeuva*, *Eucalyptus camaldulensis* and *E. grandis*. DNA was extracted from soil (composited samples were collected in 2004) and also from spores, with "Fast DNA kit for soil". AMF morphotypes were sequenced and identified through comparison with sequences deposited in a data bank (NCBI/BLAST-N program). Specific primers of 18SrDNA region of Glomales Order (VANS1 x NS21) were used.

Results and Discussion

DGGE patterns, based on 18S PCR specific primers, showed a common band in all samples and different bands were present in monocultures and mixed-species plantation. The degraded area (C) showed some different bands from the P area. *Carrasco* presented higher AMF diversity than the Preserved area. Samples obtained in areas planted with *Plathymentia* sp., *Enterolobium* sp., *Schinopsis* sp. and *Myracrodruon* sp, according to the taxonomic analysis of genotypic characters (UPGMA), presented similarity with P, specially the inoculated mixed stands. *Anadenanthera peregrina* ("Angico") monoculture samples presented higher similarity with C. This can be explained based on the fact that this species occurs also in C vegetation, while the others occur only in the Woody caatinga (=P) (Del Rey, 1991). Genetic spore identification was confirmed by microscopic spore structure observation, which revealed the following species: *Gigaspora rosea* and *Scutellospora cerradensis*. The species morphologically consistent with *Scutellospora coralloidea* presented 100% of genetic similarity with *Scutellospora castanea* and *Scutellospora persica*. Spores isolated as *Glomus* sp1 were identified genetically as "uncultured *Glomus* clone PA170", with 96% of similarity. This clone was isolated from an important tree species in dry afro-montane forests of Ethiopia (Wubet et al., 2003). *Acaulospora* species are still being studied.

Conclusions

Data obtained from a taxonomic analysis indicate that the restoration of the experimental area that includes tree Caatinga species is under way. Results point that the DGGE technique can be used for comparative analysis of AMF diversity in the different models and reference areas, indicating the stage of recuperation of semi-arid degraded areas in Minas Gerais. Molecular identification of AMF spores had a significant role in the study. The DGGE technique may be considered as an important tool to estimate the semi-arid recuperation in Minas Gerais.

References

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