MYCORRHIZAL SYMBIOSIS OF NURSE PLANTS AND ITS APPLICATION IN ECOLOGICAL RESTORATION OF *Acacia tortillis* sub sp *radiana* IN MOROCCAN ARID ECOSYSTEMS

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Abstract

Nurse plants are those that facilitate the growth and development of *Acacia tortillis* beneath their canopy. Nurse plants have been mainly used to restore vegetation in arid and sub-arid zones in recent years. The aim of our study is to evaluate the effect of arbuscular mycorrhizal on the growth of *Acacia tortillis.* We investigate to study the effect of different sources of soil influenced by the nurse plants, collected from Ait Ourzine region in the south of Morocco, and compared with a soil which not influenced by nurse plants.

Introduction

In Morocco, the process of desertification affects large areas (more than 90% of the territory). It is very noticeable that the climate is arid and soils are vulnerable to erosion. Also, precariousness of life of the rural populations pushes them to overexploit the natural resources to satisfy their increasing needs, which accentuates the deterioration of surroundings. *Acacia* species are widely distributed through the drier region of the Moroccan south. In North Africa, the genus is less well represented, mainly due to over exploitation. The role of Acacia species in the rural economy and their economic potential has been absolutely very important (commercial, economic, ecological...).

Methods

- Soil sampling

0-15 cm soil core (Aït Ouzzine region, N 30' 856 67''- W 005' 900 68'', altitude 1022 m)

12 plant species (3 soil cores / plant) and 1 adjacent unplanted soil

- Chemical analysis

C (Aubert., 1970) N (Kjeldahl), P (Olsen et *al.,* 1954), contents

- Comparison of *A. raddiana* growth and mycorrhization parameters on soil from distinct origins

7-month pot culture (1 kg soil / pot and 10 Acacia pots / soil origin)

28°C, photoperiod 12h, daily watering

Growth parameters: shoot-root biomass and shoot height

Mycorrhization parameters: nb. vesicules / arbuscules per cm root (Philips & Hayman (1970))

Results and discussion

The results showed that after six months of cultivation. The soil influenced by nurse plants contains a microbial community which is characterized by a high density of arbuscular mycorrhizal (see figure 1); the latter significantly increases the growth of *Acacia tortillis*. We also noticed that the roots and shoot dry weight was significantly improved (see figure 2).

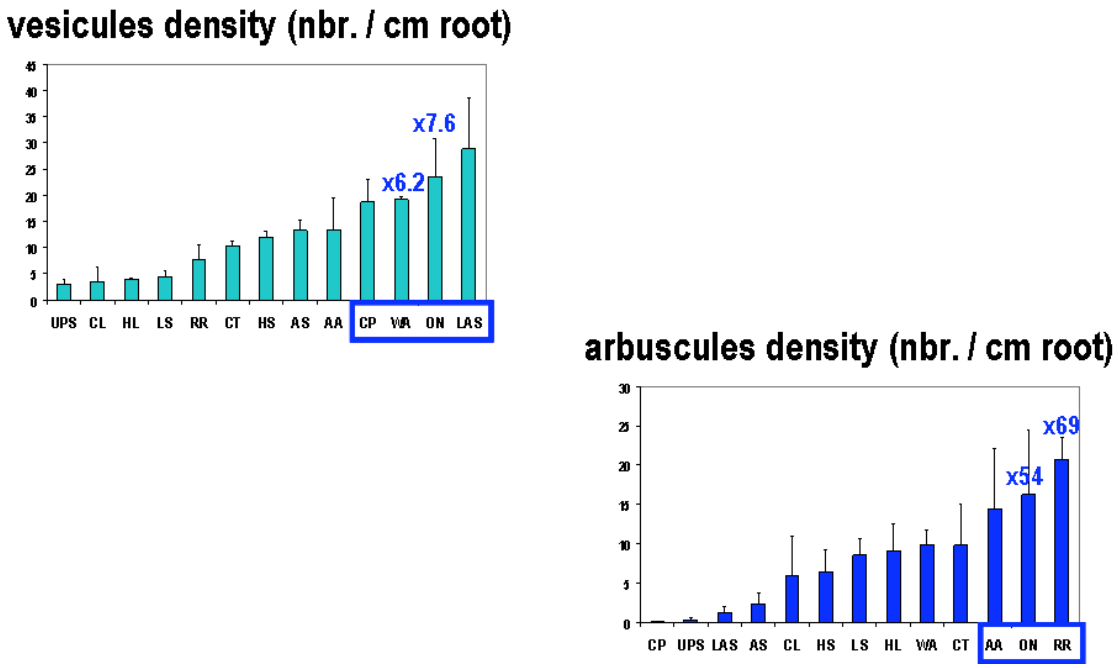

Figure 1. A. raddiana mycorrhization intensity

Under semi-arid conditions, it is well known that AM fungal inoculum potential is very low and it has been already been shown that AM inoculation of plants is very efficient in establishing plants on disturbed soils (Estaun et al., 1997).

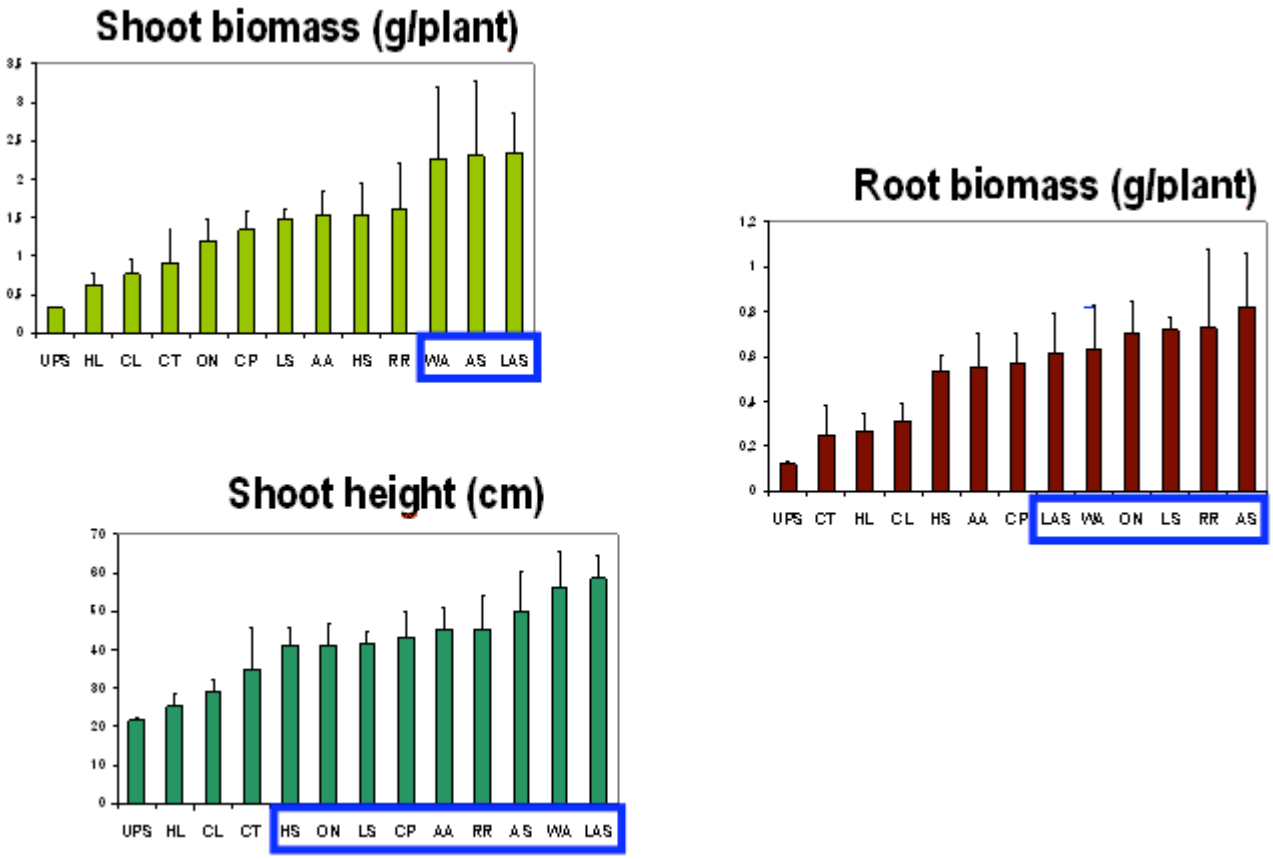

Figure 2. Facilitating effect of transfered soils on A. raddiana growth performance

The AM fungus, Glomus intraradices was examined for its effect on the growth of Acacia holosericea, plant-available phosphate and soil microbial activity without added rock phosphate. AM fungal inoculation significantly increased the plant shoot and root biomasses (Duponnois et al, 2004).

AM fungi can exude substances that have selective effects on the microbial community in the rhizosphere and in the soil (Hobbie, 1992; So¨derstro¨m, 1992). For instance, mycorrhizal fungi can solubilise surrounding weatherable minerals through excretion of organic acids (Landeweert et al., 2001). Furthermore, these fungal exudations could favour or alter some hyphosphere microorganisms.

Compared to the control, the mineral analysis showed high concentration of phosphorus and micronutrients such as nitrogen in the soil (see figure 3).

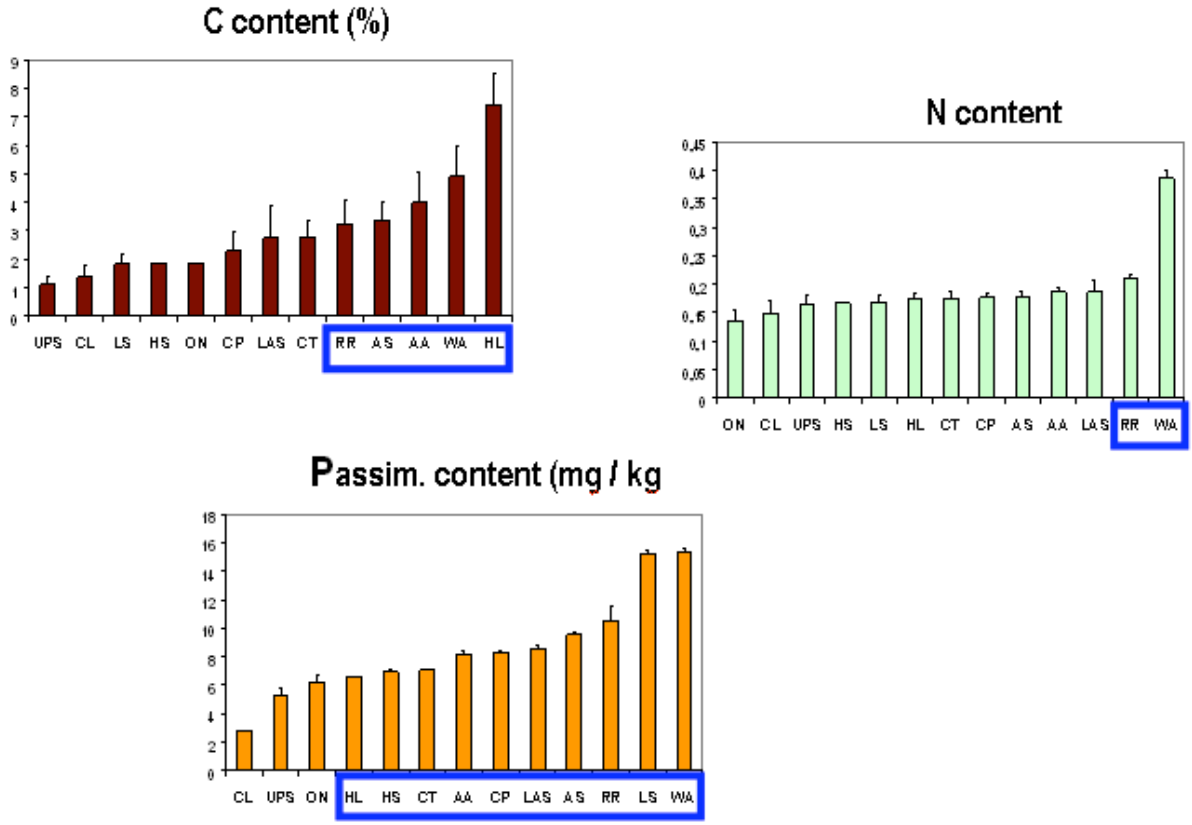

Figure 3. Companion shrubs effect on soil nutrient pools

It is well established that mycorrhizal symbiosis is a key component of revegetation processes in degraded soils. In Mediterranean ecosystems, the use of droughttolerant, native plant species has been proposed to accelerate the natural successions and to re-establish functional shrublands (Francis and Thornes, 1990; Herrera et al., 1993)

Conclusions

Screening of local companion shrubs and herbaceous species led to the selection of *Astericus Launea Lavandula* and the legumes *Ononis Retama Withania* as the most efficient species to create chemical and microbial fertility islands that are beneficial to growth and mycorrhization of *Acacia raddiana*.

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