Restoration of a mallee community., the role of mycorrhizal symbiosis

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The importance of maintenance of areas of natural vegetation as sources of plant and microbes propagules is commonly underlined as a way to preserve plant diversity, but there is scant information about the actual effect on species recruitment.

It has been suggested that the presence of vesicular-arbuscular mycorrhizal fungi is important in the rehabilitation of semi-arid ecosystems, since in these environments plant available phosphate is often low.

To study the role of mycorrhizas on the rehabilitation of those ecosystems it is necessary to assess first the presence and abundance of mycorrhizal fungi, and the potential of the soils to infect native plants. The subsequent logical steps are the study of the response of native plants to mycorrhizal infection, (e.g. seedling survivorship and establishment, plant growth and reproduction), and the effect of the symbiosis on competition between the native plants and the community of weeds.

We assessed the mycorrhizal infectivity of three soils of a malice community with different disturbance histories: undisturbed mallee vegetation (malice), rolled malice left uncultivated (re-growth), former pasture (pasture). We used a bioassay technique, where "trap" plants were grown in standard conditions in soil from the different disturbance histories and the extend of mycorrhizal formation was subsequently assessed. We were constricted to perform mainly glasshouse studies because the growing season (July-September 1997) was extremely dry. Roots were stained and scored for mycorrhizal infection at 6, 12 and 24 weeks after planting.

Although the study of the population of sporulating fungi was not originally included in the project, we considered it important to complete the assessment of the soils infectivity, we thus took samples of soil from each core at 12 and 24 weeks, and separated the spores using a wet sieving - sucrose gradient method.

The plants used as "trap" were E*ucalyptus incrassata, Acacia calamifolia, Danthonia caespitosa* and *Trifolium subterraneum*

The percentage of root length infected by mycorrhizal fungi varied with the species and the type of soil (Fig. 1). It generally increased with time (Fig. 1).

We also found a clear difference in the species of sporulating fungi between the sites (Table 1).

We initiated as well pot cultures using the species listed above as trap plants. Inoculum from these pot cultures (soil containing spores and roots infected with wild fungi) will be used in further field and glasshouse experiments, Meanwhile, we have succeeded in inoculating *E incrassata* and *A. calamifolia* with a cultivated fungus (*Glomus intrarradices).* This fungus will be used in our next glasshouse experiments to study to what extent mycorrhizal infection affects competition between the community of weeds from the pasture site and the dominant native plant species.

This project provided basic information for the development of more extensive studies on mallee restoration and for the understanding of the biology of native species.

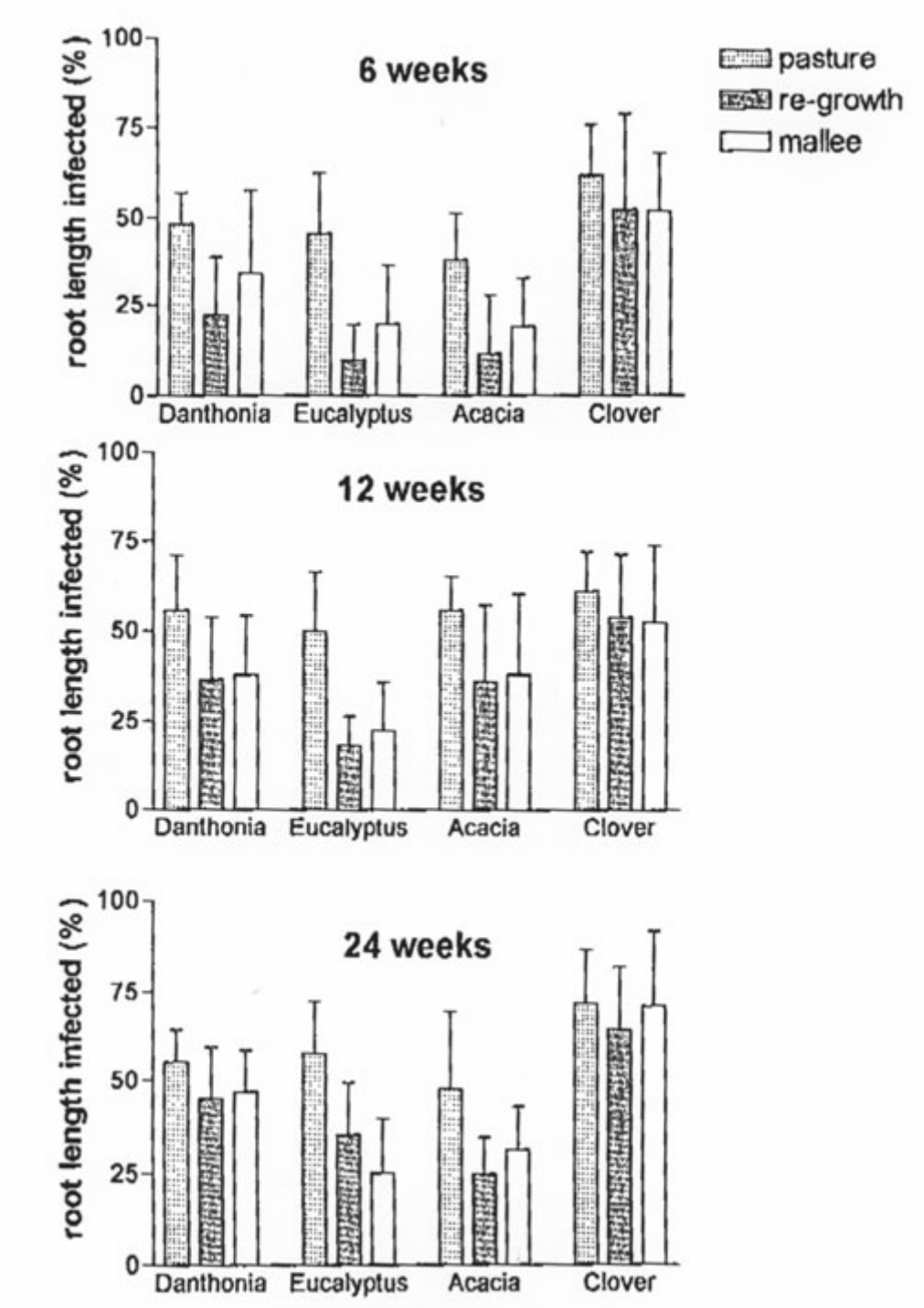

Figure 1. Percentage of root length infected with mycorrhizal fungi of plants of *Eucalyptus incrassata, Acacia calamifolia, Danthonia caespitosa and Trifolium subterraneum* grown in mallee soils with different disturbance- mallee (undisturbed vegetation) clear columns, re-growth (malice rolled and left uncultivated) dark grey columns, and pasture (20 years since last cultivation) light grey columns. Data are means of transformed percentage of infection (arcsin (sqrt ratio)) plus SD, n = 10.

Table 1. AM fungi species in pasture (P), re-growth (R) , mallee (M) soils with host plants *Eucalyptus incrassata* (E), *Acacia calamifolia (A), Danthonia caespitosa* (D) and Trifolium *subterraneum* (C).

AM fungi species	**AP**	**CP**	**DP**	**EP**	**AM**	**CM**	**DM**	**EM**	**AR**	**CR**	**DR**	**OR**
Acaulospora sp.	3							3				
Glomus etunicatum			2	11								
Glomus caledonium	2			12								
Glomus clarum				3								
Glomus geosporum		2										
Glomus macrocarpum	2			2								
Glomus microaggreregatum		39										
Glomus mosseae	15	90	18	10					1	12	1	
Glomus sp	13	34	4	9	2	1	1	2		4	2	
Gigaspora sp	7	6	10	9		1		1		3	2	
Gigaspora gigantea				3								
Gigaspora margarita		4										
Scutellospora biornata		4			1	2			5	8		7
Scutellospora heterogama		4		2								
Scutellospora sp1	10	9	4		4	3	4	1	1	8	10	4
Scutellospora persica	6		2									
Scutellospora sp2		5					1			7	9	5
No identified		5		3								
Total	58	207	40	64	7	7	6	4	7	42	24	16
Young spores	20	20	0	60	10		9	2	10	11		39