

The fate of nursery ectomycorrhizae after out planting in clearcut sites

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Introduction

Ectomycorrhizal fungi (ECM) are of great importance for nutrient and water uptake of trees and also increase tree health. In forestry, ECM play a crucial role in facilitation successful establishment of seedlings after planting. ECM associated with the tree change over its lifetime. The objective of this study was to investigate the change of ECM fungi of *Pinus radiata* following the establishment of nursery stock through two years after planting.



Rhizopogon rubescens (top) and *Hebeloma* sp. (bottom) sporocarps



Rhizopogon rubescens (top) and *Tuber* sp. (bottom) colonising *P. radiata* roots

Methods



Te Ngae Nursery (left) and site in Kaingaroa Forest in first year after out planting (right)



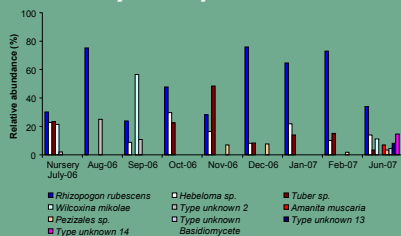
ECM of *P. radiata* seedlings were investigated in May 2006 at TeNgae Nursery, Rotorua. Seedlings were planted on a clearcut site in Kaingaroa Forest and ECM fungi colonising these seedlings were followed up regularly for two years after out planting. A four-year-old site was also investigated. ECM colonising root tips were identified with a combined morphological and molecular approach and abundance data was collected.



Pinus radiata seedling 4 months after planting in Kaingaroa Forest

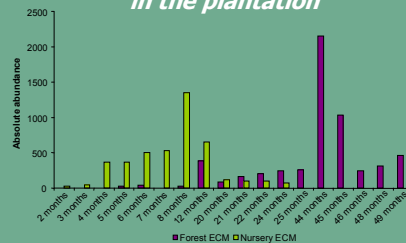
Results

ECM in nursery and first year in plantation



- Four ECM species equally dominant in nursery
- Species richness increased after one year
- Nursery ECM survive out planting and prevail over forest ECM in first year, *Rhizopogon rubescens* most dominant

Change of ECM over four years in the plantation



- Transition from nursery to forest ECM from 12 – 24 months
- Changeover of ECM after two years
- *Wilcoxina mikolae* most persistent nursery ECM in the late stage
- Genus *Rubescens* present in late stage, but change from *R. rubescens* to *R. luteorubescens*, *R. pseudoroseolus* and *Rhizopogon* spp.

Table:

ECM species/ morphotype	Nursery	K06F	K06F	K06F	K04
	May 2006	2- 6 months August-December 2006	7- 12 months January-June 2007	20- 25 months February-July 2008	44- 49 months February-July 2008
<i>Hebeloma</i> sp.	+	+	+		
<i>Rhizopogon rubescens</i>	+	+	+		
<i>Tuber</i> sp.	+	+	+		
<i>Wilcoxina mikolae</i>	+	+		+	
Type unknown 2	+	+			
<i>Amanita muscaria</i>					
<i>Inocybe lepera</i>				+	+
<i>Pezizales</i> sp.		+			
<i>Rhizopogon luteorubescens</i>				+	+
<i>Rhizopogon pseudoroseolus</i>				+	+
<i>Rhizopogon</i> spp.				+	+
Type <i>Cenococcum</i> geophilum				+	
Type uncultured Basidiomycete			+		
Type unknown 13			+		
Type unknown 14			+		
Type unknown light brown				+	
Type unknown yellow					+
Type unknown black-white					+
Type unknown brown					+
Type unknown brown-white					+
Type unknown brown-yellow					+
unknown various				+	+

Conclusions

- Nursery ECM survive the first one to two years of out planting and facilitate the establishment of *P. radiata* seedlings on clearcut sites
- Change from nursery to forest ECM is slower than reported from other studies, highlighting the need for good colonisation of persistent ECM fungi from the nursery to the out planting
- Forestry practises and seedling handling before outplanting should avoid the disturbance of ECM symbionts

Acknowledgments:

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