forest health news

ensis

No. 163, June 2006 **ISSN 1175-9755**

MYCORRHIZAL COMMUNITIES IN *PINUS RADIATA* PLANTATIONS

From the mid 1970s until mid 1990s work was undertaken on mycorrhizal associations with exotic plantation trees in New Zealand by Myra Chu-Chou and Lynette Grace at the then Forest Research Institute. They investigated mycorrhizal associations mainly in nurseries but also in plantation forests, using methods such as fruiting body observation, characteristics in culture, and isolation of fungal symbionts from mycorrhizal roots. This work resulted in a far better understanding of the importance of mycorrhizal relationships with regard to trees and raised the possibility that they might be manipulated to increase productivity.

In 2004, a PhD project was initiated at Ensis to investigate ectomycorrhizal (ECM) communities associated with *Pinus radiata.* Fungal communities are being investigated from nursery through to harvest, utilising new molecular fingerprinting methods for species identification. The methods used by Chu-Chou and Grace to identify mycorrizhas were very time-consuming and in a lot of cases unsuccessful because species isolated from mycorrhizas often do not grow in culture or are easily contaminated. Molecular methods enable easy and fast species identification of the fungal associate that colonises the root tips — DNA is extracted directly from the root tip and can be analysed. Direct sequencing usually reveals the identity of mycorrhizal fungi to species level, or at least genus level. In this study the focus is on the fungal associates colonising the root tips. Studies on mycorrhizal communities used to focus on the fruiting bodies found associated with the host but molecular methods have shown that there is little relationship between what is growing aboveground and what is actually colonising the host's root tips underground. There are several reasons for this. Some species are hard to find as they fruit underground (e.g., *Rhizopogon* and *Tuber* species) and others form inconspicuous fruiting bodies. Some species do not produce fruiting bodies every year (usually because of the weather) and other species do not form fruiting bodies at all.

One of the sites being investigated is the Kaingaroa Timberlands Te Ngae Nursery in Rotorua, which is the main supplier for Kaingaroa Timberlands plantations. Over two seasons (2005–06), fruiting bodies and root tips of seedlings were investigated. The results obtained basically agree with the earlier work but a new important association was found, and direct sequencing raised and clarified some species identification questions. The most abundant species, both as fruiting bodies and colonising root tips were *Rhizopogon rubescens*, *Hebeloma* spp., and *Wilcoxina mikolae*. *Tuber* sp. was abundant on the root tips, but was not found fruiting.

Rhizopogon rubescens is one of the most important and beneficial ectomycorrhizal fungi in pine plantations in New Zealand; however, there is considerable confusion over the correct name for this species — *R. rubescens* or *R. roseolus*. Studies on the phylogenetic relationships of *Rhizopogon* in Europe using molecular methods suggest that the nominal species *R. rubescens* and *R. roseolus* are identical. Direct sequencing of fruiting body and ECM fungal material from this study agree with this, as sequences are identical for both "species". *Hebeloma* material has been identified, using morphology, as *H. crustuliniforme*. However, sequencing results have not confirmed this. Further research on the specific identification is under way.

The record of *Wilcoxina mikolae* in association with *Pinus radiata* in New Zealand is a new one. This species is a known associate of Pinaceae in Europe and North America. *Wilcoxina mikolae*, along with *Tuber* sp., are early colonisers in the mycorrhizal system and are subsequently replaced by *R. rubescens.*

This project is now in its third year. For further information see *FH News* 157 and www.ffp.csiro.au/research/mycorrhiza/index.html

Katrin Walbert

Typical mycorrhizal root structure.

*Newsletter of the **Ensis Forest Biosecurity and Protection Unit**, and the **Forest Health Reference Laboratory** (incorporating the Forest Research Mycological Herbarium (NZFRI-M), the Forest Research Culture Collection (NZFS), and the National Forest Insect Collection (FRNZ). Edited by John Bain, New Zealand Forest Research Institute Ltd, Private Bag 3020, Rotorua. <john.bain@ensisjv.com> Web site < http://www.ensisjv.com/biosecurity >*

CSIRO SCION

THE JOINT FORCES OF CSIRO & SCION

A NEW NEMATODE INFECTION OF AN INDIGENOUS SHRUB

Although nematodes are perhaps more commonly known for causing root and stem infections (e.g., potato cyst nematode and pine wilt nematode) they can also cause foliage disease. The nematodes directly infect the leaves (sometimes arthropod vectors are involved) and feed on the leaf tissue. Generally, symptoms develop as discoloured areas in leaves; these are often angular in outline with lesions bounded by the veins of the leaves.

Pittosporum crassifolium leaves infected with *Ditylenchus drepanocercus*

Recently MAF nematologist Dr Karen Knight identified a nematode disease previously unknown in New Zealand. *Ditylenchus drepanocercus* causes a patchy chlorosis of *Pittosporum crassifolium* leaves. Symptomatic *Pittosporum* was collected in the Auckland district in 2001 but formal identification of the nematode was undertaken in 2005. Information about *D. drepanocerus* is scarce. Previously it was thought that this species was limited to the plant genus *Miconia* which is from South America. It has been found infecting *Miconia calvescens* (commonly known as velvet tree) which has become an aggressive invader in Tahiti, Hawaii, and other Pacific islands. *Ditylenchus drepanocercus* is being considered there for inclusion in an integrated biological control programme of this weed.

The origin of the nematode in New Zealand is unknown.

This item is based on information provided by Dr Karen Knight and Chris Inglis of Biosecurity New Zealand. Photo supplied by Biosecurity New Zealand.

Margaret Dick

BIOSCURITY SHARP-SHOOTER

The Forest Biosecurity team has a sharp-shooter in its ranks but not of the glassy-winged variety that transmits Pierce's disease of grapes in California. Pam Taylor, our quarantine facility manager, has been selected for the North Island women's small bore rifle team to compete against the South Island in Christchurch. Pam's shooting skills have been put to good use on the work front. She is a dab hand at shooting branches out of tall trees to collect foliage samples. Good luck for the inter-island match, Pam.

Editor

NEW RECORDS

New distribution record for New Zealand – Fungus: *Melampsora ricini*; Region: Hawke's Bay; Host: *Ricinus communis*; Coll: B Rogan, 11/06/2006; Ident: M Dick, 13/06/2006; Comments: This fungus which was first found in New Zealand in 1999 causes premature leaf casting. It had previously been found in Northland, Auckland, and the Bay of Plenty.

New host record for New Zealand – Fungus: *Cryptosporiopsis edgertonii*; **Region:** Nelson; **Host:** *Pinus mugo*; **Coll:** B Doherty, 05/06/2006; **Ident:** M Dick, 14/06/2006; **Comments:** This fungus has been isolated from a variety of hosts (*Acer, Chamaecyparis, Ilex, Nothofagus, Podocarpus, Betula*) with symptoms of twig and branch dieback and cankers but pathogenicity has not been established.

New host record for New Zealand – Fungus: *Sphaeropsis sapinea*; **Region:** Nelson; **Host:** *Pinus heldreichii*; **Coll:** B Doherty, 05/06/2006; **Ident:** M Dick, 21/06/2006; **Comments:** This is a ubiquitous fungus that is generally considered to be a wound pathogen but is also capable of infecting undamaged young tissue.

New distribution record for New Zealand – Insect: *Dicranosterna semipunctata* (Chrysomelidae); **Region:** Coromandel; **Host:** not applicable; **Coll:** R Thum, 16/06/2006; **Ident:** D Jones, 19/06/2006; **Comments:** This Australian defoliator was first found in New Zealand in 1996. It is usually found on *Acacia melanoxylon* and has previously been recorded from Northland, Auckland, Waikato, and the Bay of Plenty.

New host record for New Zealand – Insect: *Platypus apicalis* (Curculionidae)**; Region:** Gisborne; **Host:** *Pinus devoniana*; **Coll:** B Rogan, 09/06/2006; **Ident:** D Jones, 14/06/2006; **Comments:** This native pinhole borer has been recorded from quite a wide range of native and exotic hosts. (Note: *Pinus devoniana* used to be known as *P. michoacana.*)

New host record for New Zealand – Insect: *Hylurgus ligniperda* (Curculionidae); **Region:** Gisborne; **Host:** *Pinus devoniana*; **Coll:** B Rogan, 09/06/2006; **Ident:** D Jones, 14/06/2006; **Comments:** This European bark beetle (first New Zealand record 1974) is found throughout most of the country. It breeds under the bark of logs and stumps and is capable of vectoring sapstain fungi. It is usually found in *Pinus* spp. But there are a few records from *Larix* spp. and *Pseudotsuga menziesii.* It is also found in Australia, Japan, Sri Lanka, South Africa, Algeria, Cyprus, Chile, and the USA.

New host record for New Zealand – Insect: *Mitrastethus baridioides* (Curculionidae); **Region:** Gisborne; **Host:** *Pinus devoniana*; **Coll:** B Rogan, 09/06/2006; **Ident:** D Jones, 14/06/2006; **Comments:** This native, wood-boring weevil has been recorded from quite a wide range of timbers. It prefers somewhat damp situations.

New host record for New Zealand – Insect: *Ceroplastes destructor* (Coccidae); **Region:** Gisborne; **Host:** *Euonymus japonica*; **Coll:** P Bradbury, 09/06/2006; **Ident:** D Jones, 14/06/2006; **Comments:** This introduced scale insect was first reported from New Zealand in 1940. Overseas it has a very wide host range and in New Zealand has been recorded from *Actinidia deliciosa, Choisya ternata, Citrus* spp., *Eucalyptus ficifolia, Griselina lucida, Lophostemon conferta, Nerium oleander, Pittosporum eugenioides,* and *Pseudopanax discolor.* It is a serious pest of *Citrus* spp. in Northland and Gisborne.

New host record for New Zealand – Insect: *Kalotermes brouni* (Kalotermitidae); **Region:** Gisborne; **Host:** *Pinus patula*; **Coll:** B Rogan, 20/06/2006; **Ident:** D Jones, 26/06/2006; **Comments:** This native termite utilises the dead, dry wood of a wide range of native and exotic hardwoods and softwoods.

(*John Bain and Diane Jones, Ensis*)

Printed by Scion Digital Print Centre, Rotorua (07-343-5711)