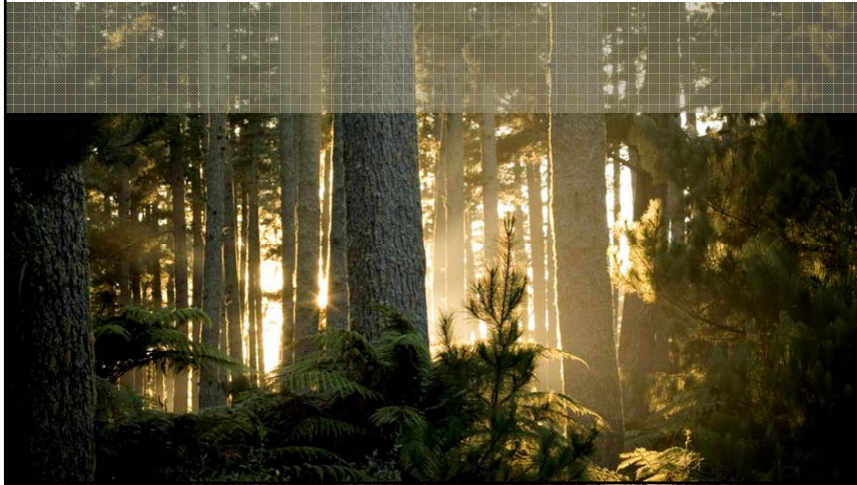


Improved Foliage Health

Beccy Ganley



Overview

- Chemical control of red needle cast (RNC)
- *Uraba* and *Paropsis* biological control
- Genetics research
- Endophyte research – thistles and radiata pine

Chemical control of RNC

Objective:

- Need chemical control option against RNC

Benefit to stakeholders:

- Cost effective chemical control
 - reduce the severity of RNC
 - current and future plantations
- Increased tree growth
- Reduce top dieback and mortality
- Avoid threat of *Diplodia* and/or Sirex outbreaks



FOA/Scion co-funded project
Scion contact: Carol Rolando



Summary of approach

- Three aerial spray trials
 - 2 trials on East Coast (sprayed June 2011 and Feb 2012)
 - 1 trial in Central North Island (sprayed Sept 2011 and Jan 2012)
- Phosphorous acid applied
- Monitoring RNC symptoms
 - ground assessments
 - ground and aerial photos
 - bioassays and chemical detection of phosphorous acid
 - Rapid Eye Satellite Imagery to assess treatment response



Results

- No key results yet
- Expect any response to phosphorus spray application will be observed this winter as symptoms develop



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Genetics trial assessment

Objective:

- Determine if there is genetic resistance to RNC



Benefit to stakeholders:

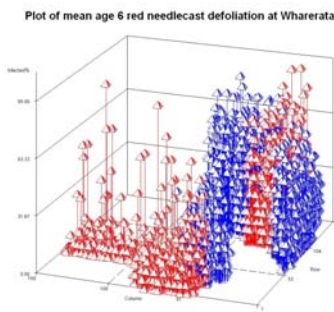
- Increased productivity
- Improved options for replanting with *P. radiata* on at risk sites

RPBC/Scion co-funded
Scion contact: Heidi Dungey

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Results

- Whararata trial inspected in September and assessed the following week.
- Estimates show heritability to be 0.21 to 0.31
- Indicates that RNC is heritable and should respond to selection



Genetic research projects – current & future

- Can needle retention be used to develop cross resistance in RPBC germplasm against multiple foliar diseases.
- Develop efficient and effective farm-field screening methods for resistance/tolerance of dothistroma needle blight, cyclaneusma needle cast and red needle cast.
 - Operational inoculation systems for all foliar diseases
 - Early disease screening systems
 - Mechanisms of resistance (genomic, metabolomic, proteomic research)

Uraba lugens biological control

Objective:

- Track spread of *U. lugens* (gum leaf skeletoniser) to new regions
- Maximise establishment and distribution of the biocontrol agent *Cotesia urabae*



Benefit to stakeholders:

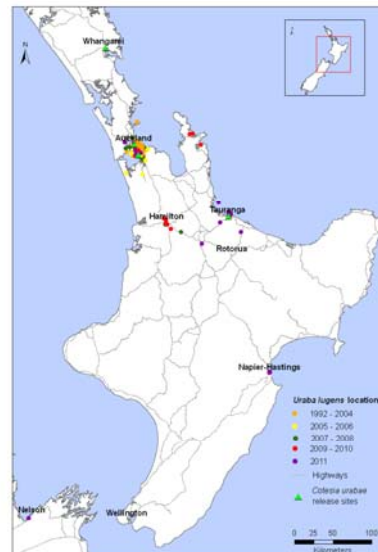
- Reduced impact of *U. lugens* on eucalyptus
- Reduced public health impact and City Council treatment costs (release requested by Whangarei Council)

Scion funded (2012)
Scion contact: Toni Withers



Gum Leaf Skeletoniser (GLS)

- North Island plus Nelson
- On the cusp of the central North Island plateau
- Found at Port of Whangarei last spring
- Continuing to spread
- Threat to public health and plantation eucalypts



Cotesia urabae – parasitoid of GLS

Gonzalo Avila

- M.Sc. student at Auckland University

Research highlights :

- Five *C. urabae* releases at two Auckland locations
 - Auckland Domain and Manukau Memorial Gardens
- Parasitoid cocoons found <60m away
- Dispersal greater down-wind
- Potential distribution of *C. urabae* may be limited by wet-stress in high altitudes



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Paropsis biological control

Objective:

- Sustainable management of tortoise beetle (*Paropsis charybdis*)

Benefit to stakeholder:

- Sustainable biological control
- Allow increased *E. nitens* investment
- Provide forest growers with a species that is not susceptible to conifer diseases



Scion/Southwood Exports funded
Scion contact: Toni Withers

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Results

- Promising spring-active parasitoid (*Eadya paropsidis*) that attacks all sizes of Paropsine larvae on *E. nitens*.
- Confirmed it attacks and rears through on *P. charybdis*



Parasitoid wasp *Eadya paropsidis* stinging a tortoise beetle larva in Tasmania

Submitted SFF bid for introduction of a new biocontrol agent to NZ
(Southwood Exports, FFR, FFA, CHH, FOA, Hardwood Management Ltd)



Endophyte research - thistles

Objective:

- To determine if endophytes are impacting the effectiveness of a thistle mycoherbicide



Benefit to stakeholders:

- Part of the Undermining Weeds Programme (AgResearch/Landcare Research/PPC_{NZ}/Scion)
- Scion capability being used to solve an agricultural problem
- Increases understanding of endophyte/induced resistance
 - application of research to forest industry

Scion contact: Beccy Ganley



Summary of approach

- Identify endophytes in thistle plants using molecular and culturing methods
(Work completed with Landcare Research - Sarah Dodds + colleagues)
- Inoculate thistle plants with endophytes (bacteria and fungi)
- Challenge pre-inoculated thistles with *Sclerotinia sclerotiorum* (mycoherbicide)
- Assess thistle plants for effectiveness of the mycoherbicide



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Results

Identification:

- 67 microbes were identified (63 fungal)
- Several rust fungi of other host plants were detected
 - acting as pathogen reservoir?

Mycoherbicide challenge:

- Seed source was significant (host genetics important)
- Endophyte treatments were significant
 - 2 treatments no different from control
 - 3 treatments significantly enhanced mycoherbicide effectiveness (i.e. helped kill the thistles)
- No significant interaction between treatments and seed origin

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Endophyte research – radiata pine

Objective:

- To test the ability of fungal endophytes to provide resistance against dothistroma needle blight

Benefit to stakeholders:

- Control option for needle diseases
- Increased forest productivity



FOA/Scion co-funded
Scion contact: Beccy Ganley



Summary of approach

- Inoculate pine seedlings with fungal endophytes
- Challenge seedlings with
 - *Diplodia* (stem canker disease) using artificial inoculation
 - Tony Reglinski (Plant and Food) sub-contracted
 - Dothistroma needle blight – place seedlings under trees showing severe disease
- Assess level of disease symptoms on seedlings in comparison to the control



Results

- *Diplodia*
 - First experiment – 5 endophytes showed promise
 - Second experiment – no significant difference in comparison to the control
- Dothistroma needle blight
 - Seedlings assessed, awaiting statistical results
- BioProtection-funded research
 - Similar work testing BioProtection's BCAs
 - No significant difference – Robert Hill to discuss later