INCIDENCE AND SEVERITY OF PESTS AND DISEASES ON YOUNG PLANTATIONS OF *Eucalyptus globulus* IN URUGUAY

G. Balmelli[1]; S. Simeto[1]; G. Martínez[1]; D. Torres[1]; C. Pérez[2]; O. Bentancur[3]

[1] Programa Nacional de Investigación en Producción Forestal. INIA-Uruguay.
[2] Departamento de Protección Vegetal, FAGRO, UDELAR, Uruguay.
[3] Departamento de Biometría, Estadística y Computación, FAGRO, UDELAR, Uruguay.

Instituto Nacional de Investigación Agropecuaria
URUGUAY

FACULTAD DE AGRONOMIA
UNIVERSIDAD DE LA REPUBLICA

2011 IUFRO Forest Health Joint Meeting

8-11 November 2011 Colonia del Sacramento, Uruguay

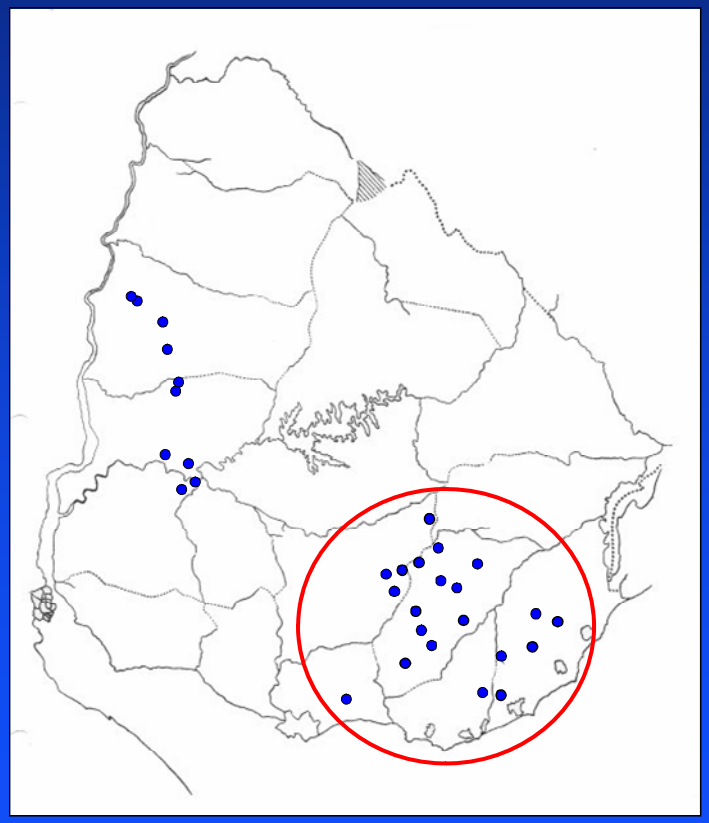
Introduction

Commercial forestry in Uruguay: ≈ 1 million hectares

- Few species: *E. globulus*, *E. grandis*, *E. dunnii*, *P. taeda*
- *E. globulus*: ≈ 250000 hectares
- Most important species in the SE
- Planted for pulp production, on short rotations (≈ 9 years)
- Highly susceptible to diseases, mainly its juvenile foliage
- Diseases and pests are a major threat to afforestation with *E. globulus*

Introduction (cont.)

- In 2009 we begun a survey to assess the incidence and severity of pests and diseases in young plantations of Eucalyptus



Objectives:

- To know which pests and diseases are present in young plantations of *E. globulus* in the SE region.
- To determine their relative importance and their geographical distribution.
- To quantify the degree of damage caused at different ages.
- To analyze the effects of site, management and genetic stock on foliar damage.

Materials and methods

- Survey: started on plantations of 6 months. The same plantations were reassessed when trees were 12 and 24 months old.

- Study area: 21 commercial plantations of *E. globulus*
  4 transects assessed per plantation
  10 trees assessed per transect (1 every 10)

- On each transect it was registered:
  geographic coordinates, soil type, topography, previous use, management intensity, number of planted trees per hectare, genetic material, average tree height and survival.

- On each tree it was assessed:
  damage due to insects (partial defoliation) and
  damage due to diseases (defoliation and necrosis)

- **For each type of damage it was quantified:**
  the incidence (percentage of affected leaves) and
  the severity (percentage of affected foliar area).

- **The total crown damage was calculated as an index**
  (adapted from Stone *et al*. 2003[1])

Damage Index: **DI = PDI + DDI**

PDI: Pest Damage Index = incidence*severity
DDI: Disease Damage Index = incidence*severity

- **Insects and symptomatic leaves from various trees were collected for identification.**

1. Stone, C., Matsuki, M. and Carnegie, A. 2003. Pest and disease assessment in young eucalypt plantations. http://affashop.gov.au/PdfFiles/PC12783.pdf

Results

Which are the main pests and diseases and what is their prevalence in plantations of different ages?

Insects

- *Ctenarytaina eucalypti* was the most prevalent and was present on 100% of transects in all surveys. The incidence (% of tips affected) on the three surveys reached 88%, 55% and 65%.

- *Gonipterus* spp. had low prevalence (6%) at 6 months and very high prevalence (94% and 99%) at 12 and 24 months.

  The degree of damage (incidence x severity) was very low on all surveys (<1%).

- *Thaumastocoris peregrinus* was found on all surveys, with low prevalence (<10%)

Diseases

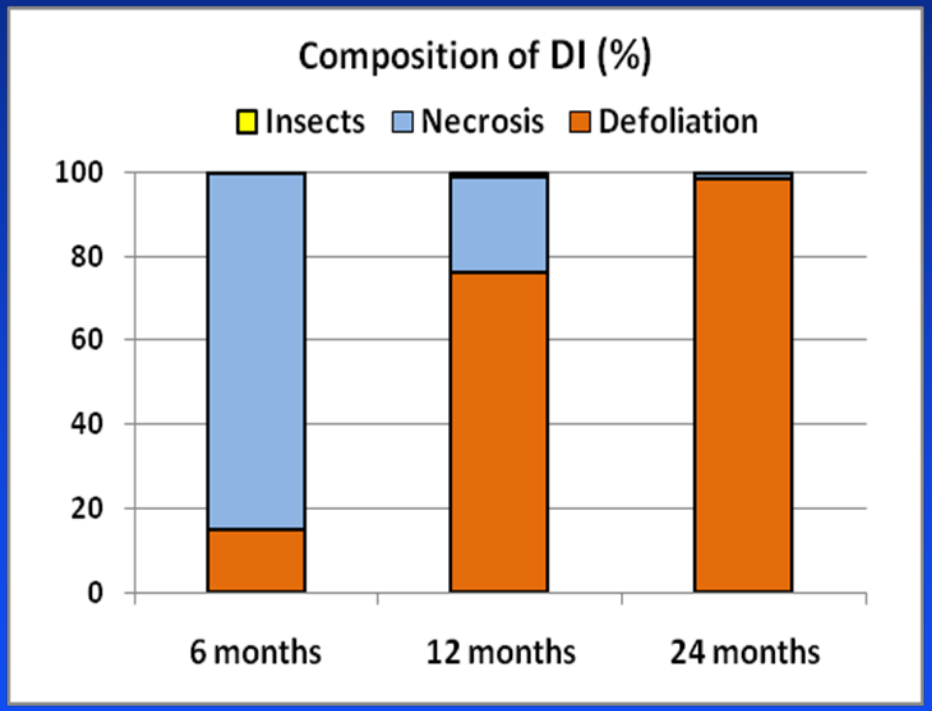
- Eucalypt rust (*Puccinia psidii*) was found only on trees of 6 months, with a prevalence of 57%.

- **Mycosphaerella Leaf Disease (mainly *Teratosphaeria nubilosa*) was the most important health problem on all surveys.**

  It had a prevalence of 100% (presence on all transects) and high incidence and severity of leaf spots and defoliation.

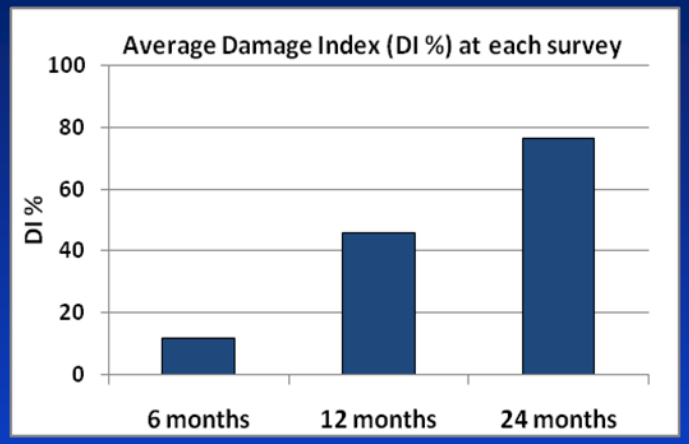
What was the relative importance of pests and diseases?

Which was the main disease symptom: necrosis or defoliation?



- The damage caused by diseases accounted for almost 100% of the DI on all surveys (99.8%, 99.1% and 99.4%).
- Necrosis was the main component of the total foliar loss at 6 months (85% of the DI).
- Defoliation was more important in the last two surveys, representing 76.1% of the DI at 12 months and 97.7% at 24 months.

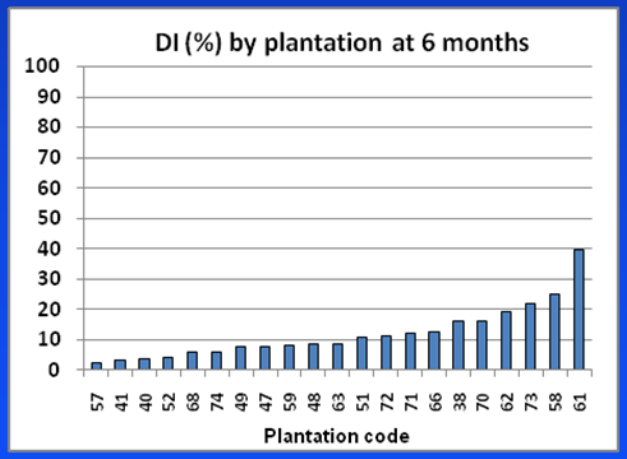
What was the extent of foliar damage due to diseases (DDI) on each survey and what was its variation among different plantations?



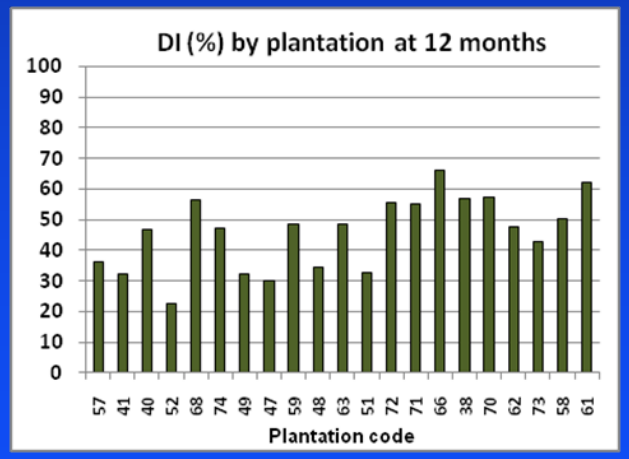
The average foliar damage was low at 6 months, with a DI of 12%,

it was high at 12 months, with a DI of 46.2%

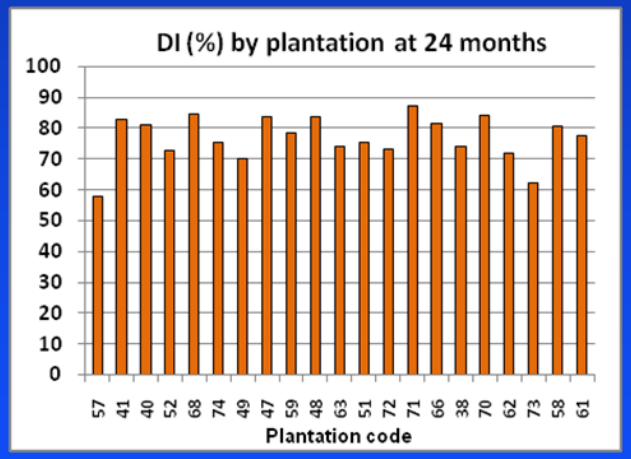
and was very high at 24 months, with a DI of 75.8%



DI range: 2.1 to 39.7%



DI range: 22.6 to 66.3%



DI range: 58 to 87.3%

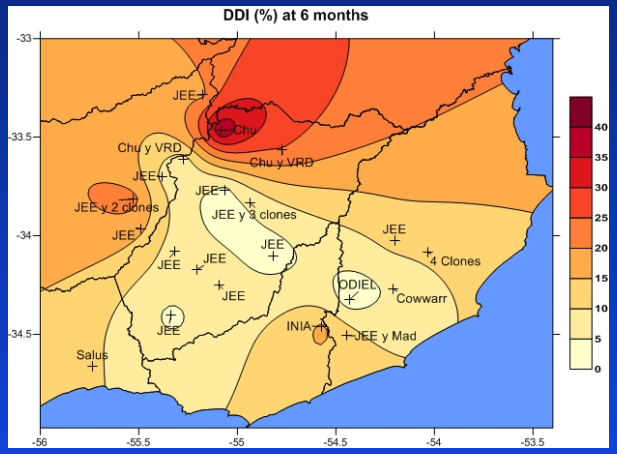
The differences among plantations on the damage index were not stable over time.

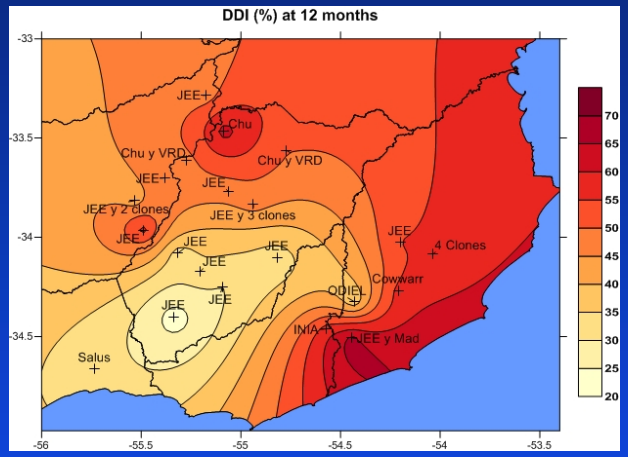
Survey at 6 months
(average DI = 12%)

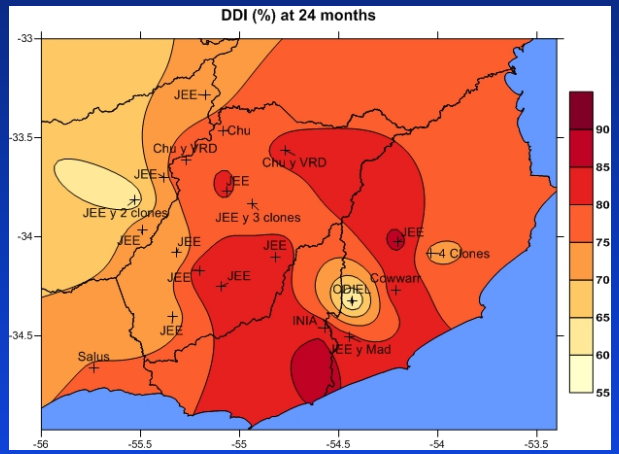
Survey at 12 months (average DI = 46.2%)

Survey at 24 months (average DI = 75.8%)

Is there any pattern of geographic variation in the extent of damage?



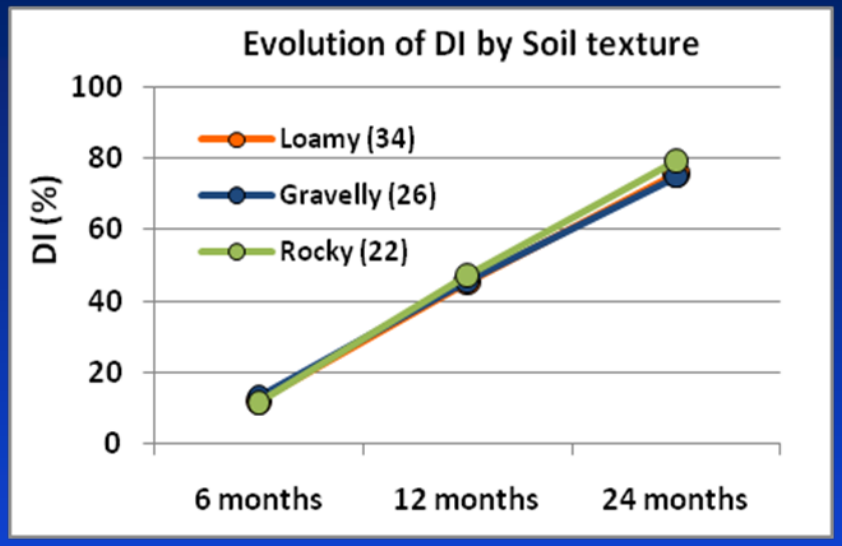


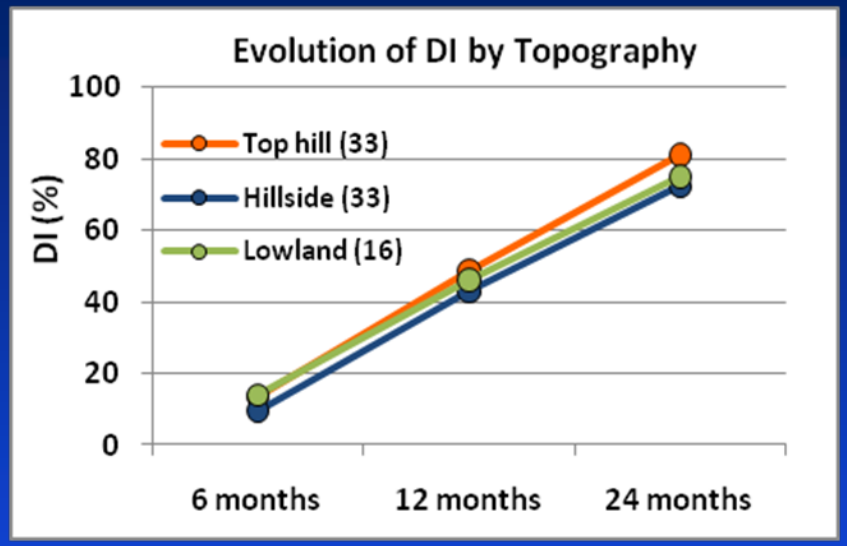


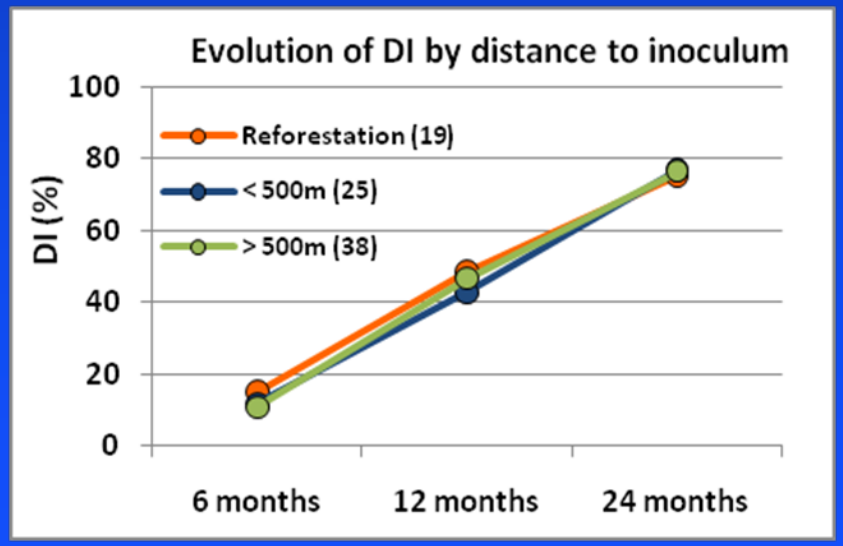
If there is a pattern of geographic variation, it is not stable over time.

The climatic variability at the local scale could determine the production of inoculum and the efficiency of infection.

Are there characteristics of the site that could explain the differences among plantations in the extent of damage?

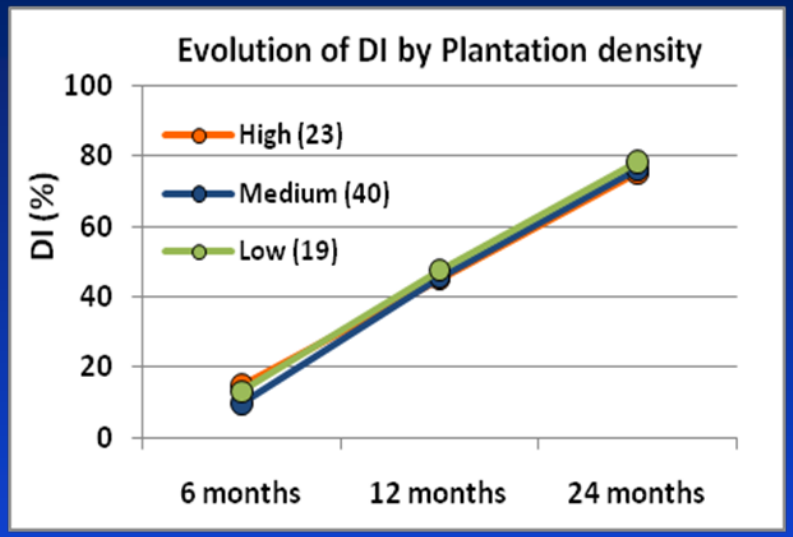


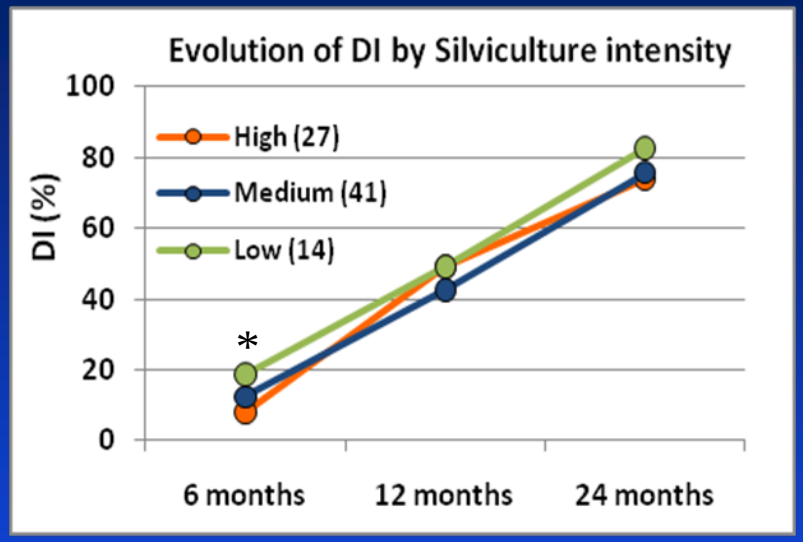




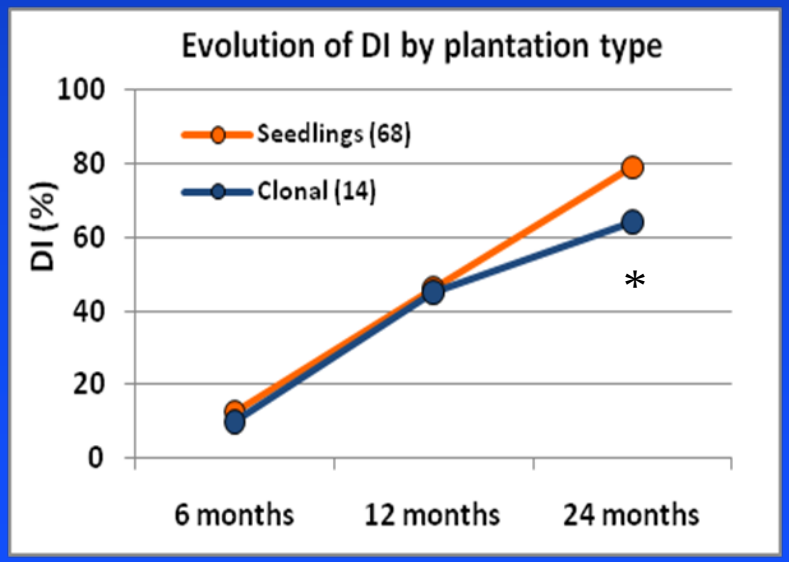
The DI between 6 and 24 months was not dependent on soil texture, topography or distance to other plantations.

Are there silvicultural factors that could explain the differences among plantations in the extent of damage?





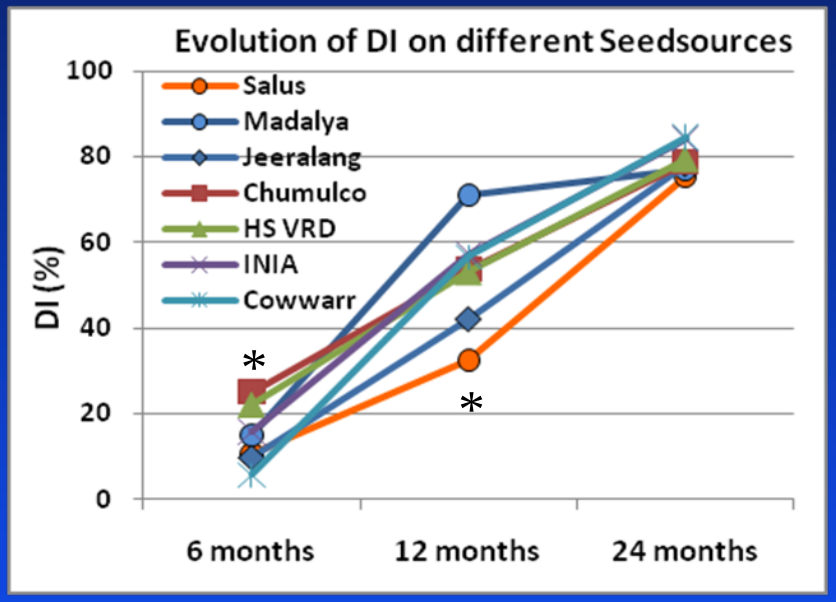
* Significant differences

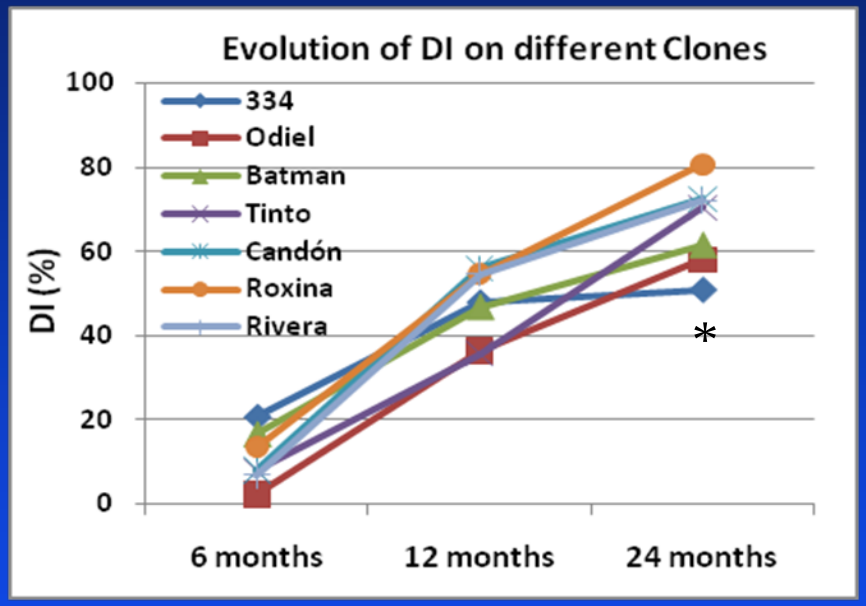


The DI did not depend on plantation density or management intensity.

Plantation type affected the DI at 24 months: clonal plantations (mainly with adult foliage) had less damage than seedling plantations.

Is there any effect of genetic stock on the extent of disease damage?





* Significant differences

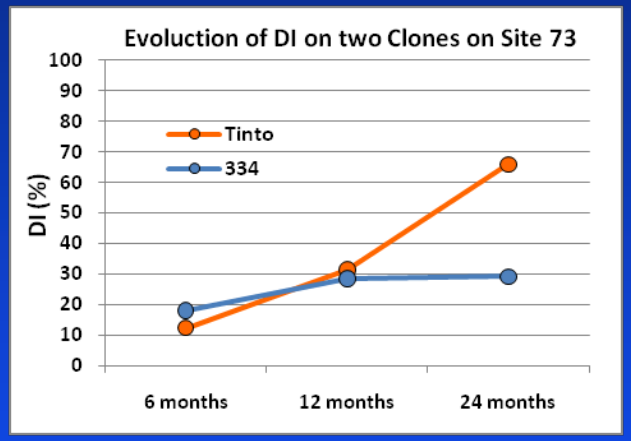
There were significant differences between genotypes in the DI.

However, there was a change in the ranking of genotypes from one survey to the other.

What explains the differences in the level of damage between genotypes?

Clone Tinto
12 months
DI=32%

Clone Tinto
24 months
DI=66%



Clone 334
12 months
DI=29%

Clone 334
24 months
DI=29%

Adult foliage is more resistant to MLD and explains the low level of damage at 24 months of clones with early phase change.

Conclusions

- MLD, mainly due to *T. nubilosa*, represented almost 100% of the foliar damage observed in young plantations of *E. globulus*.
- The extent of damage increased over time, from an average DI of 12% at 6 months to 46% and 76% at 12 and 24 months.
- The level of damage did not follow a clear pattern of geographic variation, at least no pattern is maintained over time.
- The DI was neither affected by type of soil, topography or distance to other plantations, nor by management intensity or plantation density.

Hypothesis: the degree of damage is determined by complex interactions among site, management, genotype and climate variables at local scale.

Conclusions

- The variability in the level of damage observed in different seed sources and clones suggests there are good possibilities of selection of resistant genotypes.
- Further research is needed to understand the epidemiology and management of MLD in order to minimize its impact on *E. globulus* wood production.

Acknowledgments

- Álvaro Perdomo
- Cambium
- Cecil Selby
- Sierras Calmas
- FAS
- FORESUR
- Grupo Forestal
- Intercontinental Timber
- Los Eucalyptus
- Redalco
- RMK
- Von Metzen

INCIDENCE AND SEVERITY OF PESTS AND DISEASES ON YOUNG PLANTATIONS OF *Eucalyptus globulus* IN URUGUAY

G. Balmelli[1]; S. Simeto[1]; G. Martínez[1]; D. Torres[1]; C. Pérez[2]; O. Bentancur[3]

[1] Programa Nacional de Investigación en Producción Forestal. INIA-Uruguay.
[2] Departamento de Protección Vegetal, FAGRO, UDELAR, Uruguay.
[3] Departamento de Biometría, Estadística y Computación, FAGRO, UDELAR, Uruguay.

Instituto Nacional de Investigación Agropecuaria
URUGUAY

FACULTAD DE AGRONOMIA
UNIVERSIDAD DE LA REPUBLICA

2011 IUFRO Forest Health Joint Meeting

8-11 November 2011 Colonia del Sacramento, Uruguay