



# REINFFORCE

*(REsource INFrastructure for monitoring and adapting  
European Atlantic FORest under Changing climatE)*

**An Atlantic Demonstration site network**

**Rebeca Cordero M.**

9 May 2017, Edinburgh, Scotland



# The demonstration site network

*Aim: test and demonstrate the efficiency of different adaptive management techniques not commonly used.*

- ❖ Business as usual trials next to the adaptive management trials for comparing results.
- ❖ Permanent automatic wind and rain measurements close to an exposed forest stand.
- ❖ Damage assessment in the case of extreme events.
- ❖ Selection of exposed sites.
- ❖ Possibility of comparing various silvicultural strategies for adaptation: sheltered regeneration, no thinning, permanent edges, deep soil preparation.



# The demonstration site network

Climatic risk addressed/ Management alternative	Demonstration site ID	Wind risk	Growth	Regeneration loss	Drought	Frost	Biotic
<b>Site preparation</b> mainly removing any old tree and applying methods for soil cultivation.	DS25	x					
<b>Density management</b> decreasing the number of stands and/or seedlings in the site. this practice is particularly important in the drought prone areas to reduce the water	DS06 DS07 DS08 DS09 DS14 DS15 DS18 DS22 DS23 DS24 DS26 DS30 DS31 DS32 DS33 DS34 DS35 DS37	x	x	x	x		
<b>Edge management</b> improving the plot's edge-stands.	DS27	x					x
<b>Species switch / comparison / mixture/ provenance</b> selecting, combining and comparing the potentially best suited species and/or provenances.	DS01 DS04 DS05 DS28 DS29		x	x	x	x	x
<b>Stand structure</b> comparing both even-aged and uneven-aged stands' tolerance to future climate.	DS10 DS13 DS36 DS38 DS39 DS40 DS41	x	x	x			x
<b>Soil organic matter enrichment</b> to improve soil water holding capacity using biochar.	DS19 DS20 DS21				x		
<b>Understorey management</b> reducing the density of understorey species to minimise water competition.	DS03				x		

Comparison of **alternative silvicultures** with **business as usual** to improve adaptation to climate change





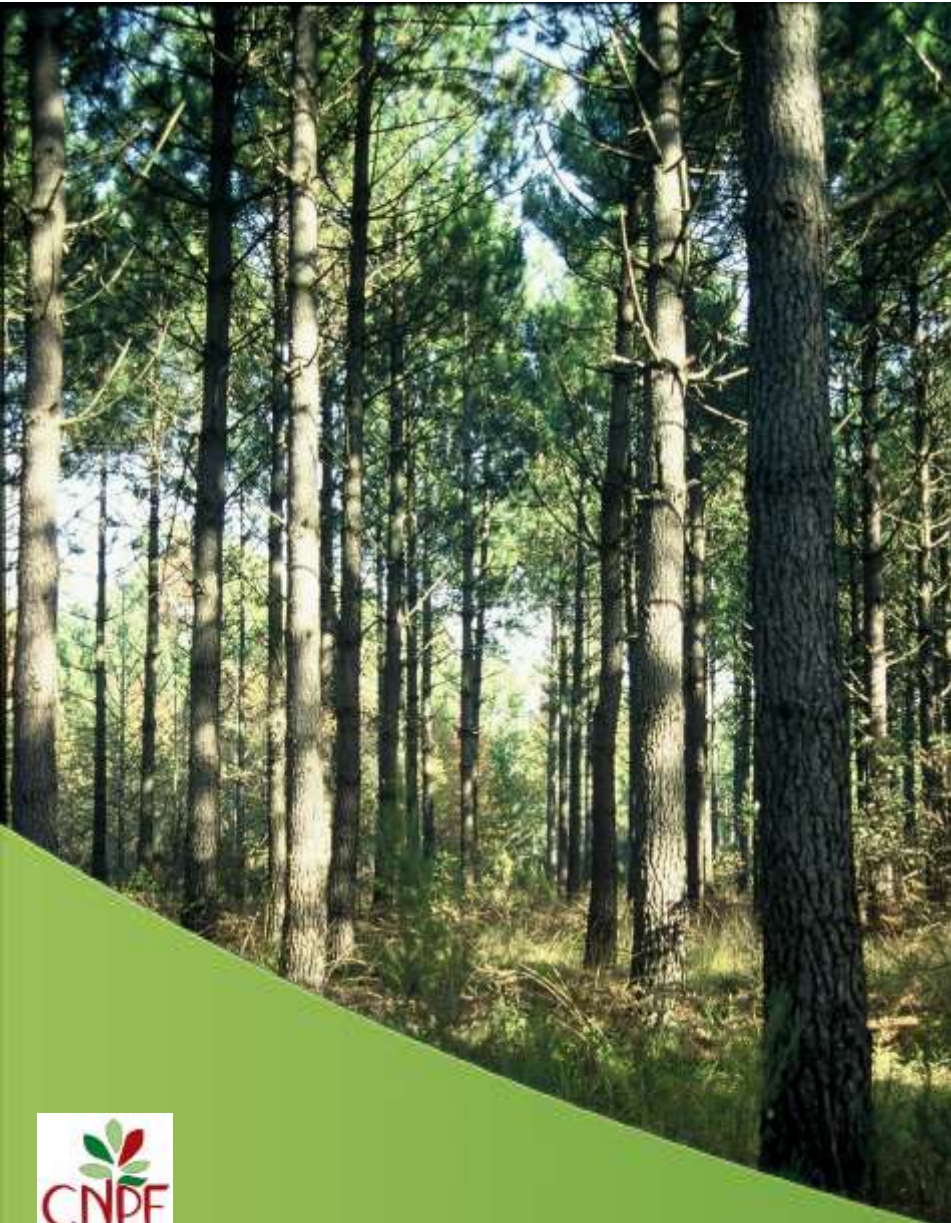
# **A REINFFORCE demonstration site on soil preparation for research on forest adaptation to climate change in France.**

**Amélie Castro (CNPf)  
Dominique Merzeau (CPFA)  
Presented by Rebeca Cordero M. (EFIATLANTIC)**



EFIATLANTIC

# Climate change and soil preparation (DS25)



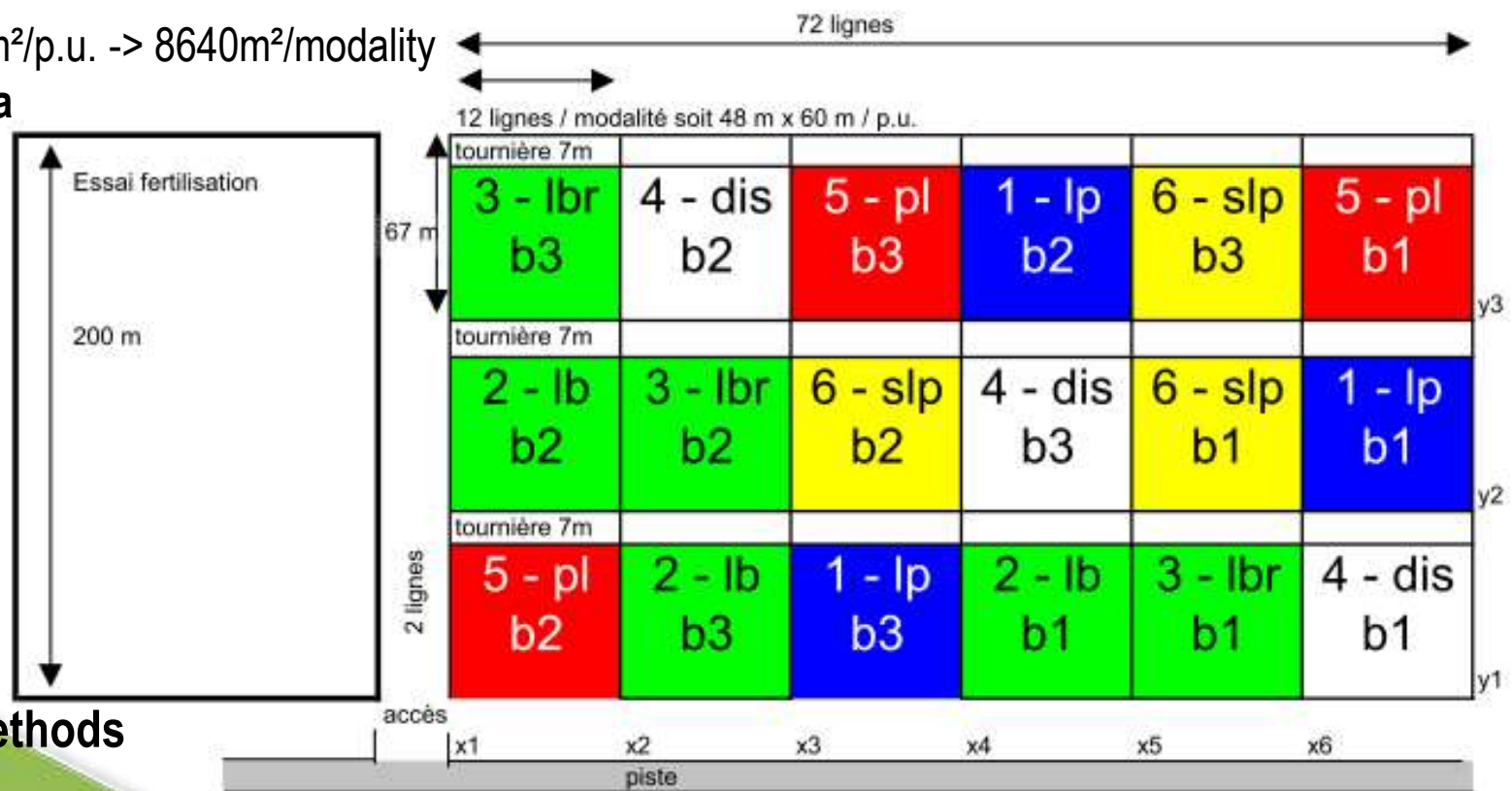
- ▶ Stand stability
- ▶ Adaptation to drought
- ▶ *Pinus pinaster*
- ▶ Sandy soil



# Comparing soil preparation methods

## ▶ Planted in winter 2011/2012

2880 m<sup>2</sup>/p.u. -> 8640m<sup>2</sup>/modality  
5,94 ha



6 methods

- 1 - lp** Full ploughing
- 2 - lb** Stripe ploughing without second ploughing between planted lines
- 3 - lbr** Stripe ploughing with second ploughing between planted lines
- 4 - dis** Discing ploughing
- 5 - pl** Direct plantation (no soil preparation)
- 6 - slp** Ripper + full ploughing



# Comparing soil preparation methods

## ► First Results: mortality rate and growth



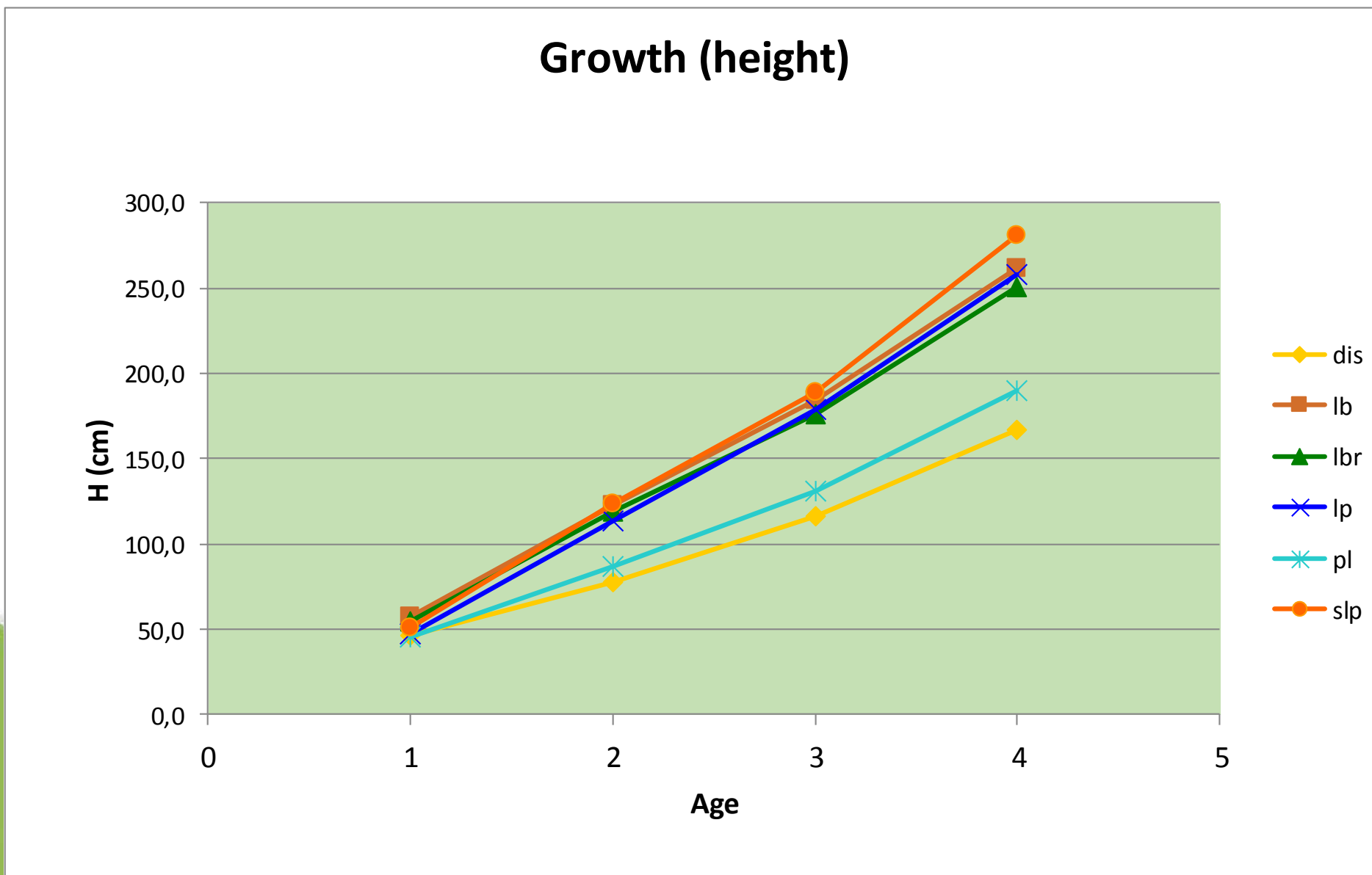
Picture : Ploughing-ripper (b2) and disk (b3) in 2017



► Greater heterogeneity in pine heights in discing system

► Significant differences in growth between ploughed and unploughed systems

- ▶ Significant differences in mortality rate in the first year:
- ▶ 11,4% of dead seedlings when disced
- ▶ 0 to 1,9% when ploughed
- ▶ 3,9% using the planting machine

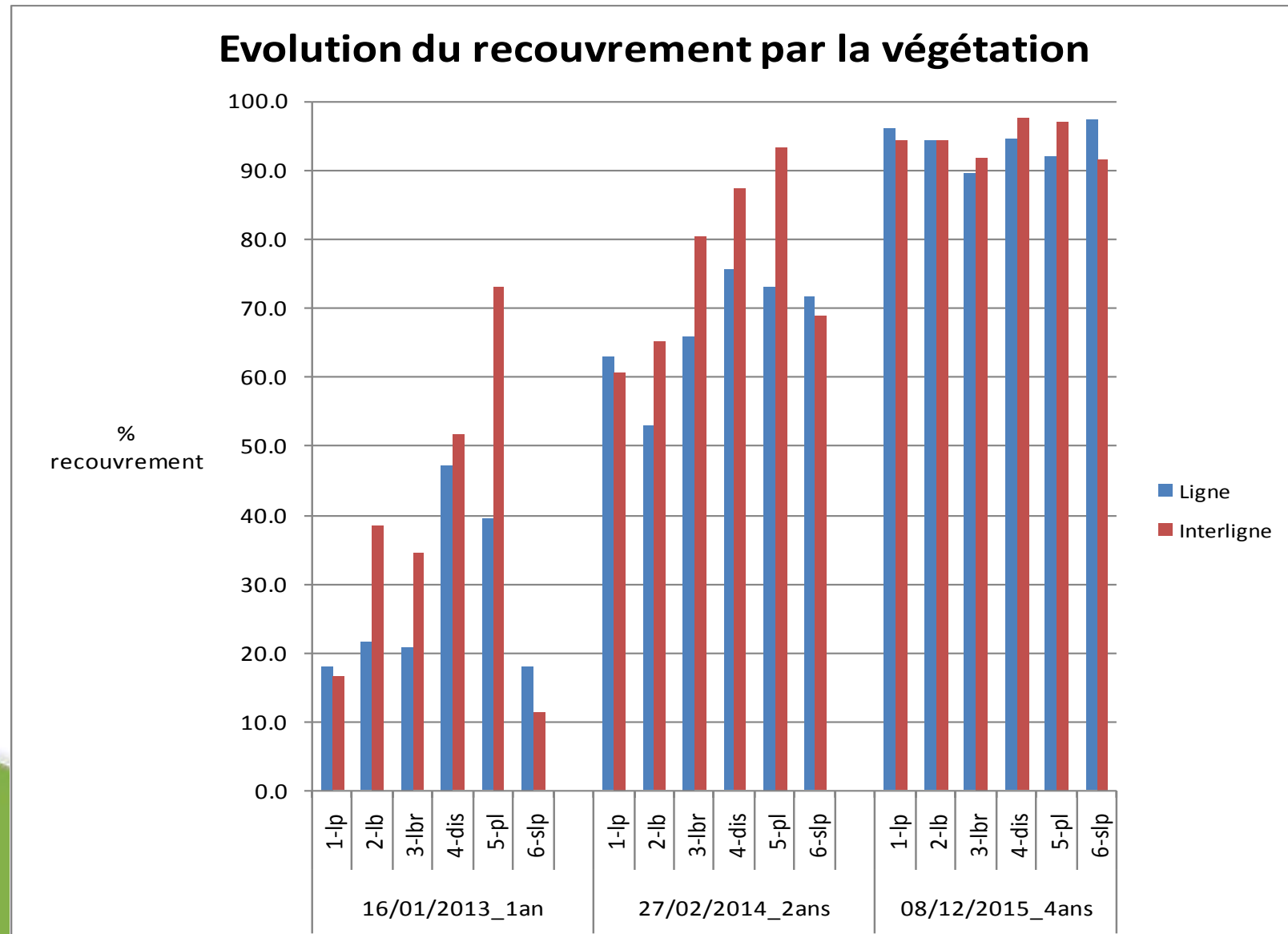




# Comparing soil preparation methods

## ► First Results: vegetation cover

- Significant differences in vegetation cover in years 1 and 2:
  - less than 20% in plantation line when ploughed
  - between 40 and 50% in plantation line when discing and with the planting machine



# Comparing soil preparation methods



► No difference between systems and planting lines and alleys in year 4

# Comparing soil preparation methods

## ▶ **First Results: temporary conclusions**

- ▶ Significant difference in growth and the gap is increasing
- ▶ One explanation seems to be quite clearly the competition of the ground vegetation (*Molinia caerulea*) in the first years.
- ▶ The effect of the ploughing on vegetation is transient, but decisive.



# Comparing soil preparation methods

## ► **First Results: temporary conclusions**

- The Arengosse site is 6 years old, yet producing interesting results and will give more, particularly the effect of ripper on the rooting depth (we hope...)
- This demonstration site is integrated in the GIS Pin Maritime du Futur (CRPF-CPFA, INRA, ONF, FCBA), and data shared with GIS PMF partners. Other soil preparation sites have since been installed and measured.
- The site is used in information meetings for forest owners by CRPF-CPFA (Next meeting 1<sup>st</sup> June!).



► Very rare butterfly (*Coenonympha oedippus*) was seen flying leisurely on his host plant *Molinia caerulea* all over the site in July 2016...

The background of the slide is a photograph of a forest landscape. In the foreground, there is a dense thicket of brown, dry brush and grasses. In the middle ground, several young pine trees are visible, some with green needles and others appearing bare. The background shows a vast expanse of a mature pine forest under a clear blue sky.

**THANK YOU  
FOR YOUR ATTENTION**