

Analysis of density effect using Nelder wheels design: current situation and challenges ahead

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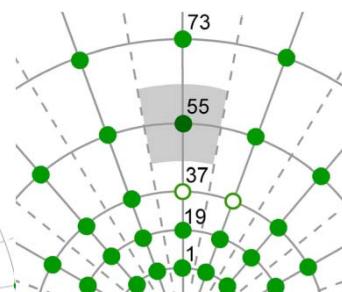
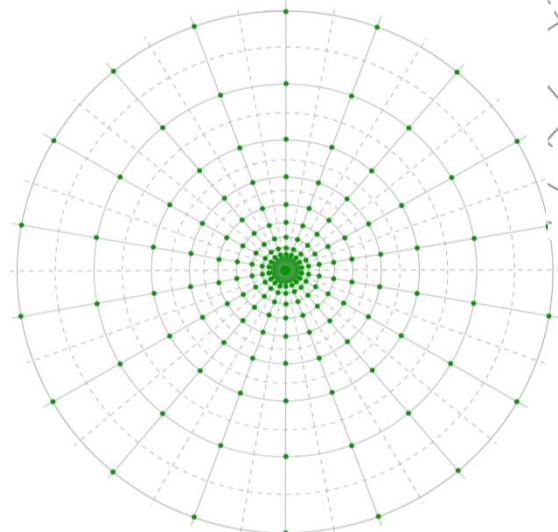
May 10th, 2017

Mixed Forest complexity and sustainability: dynamic, silviculture and adaptive management tools



INTRODUCTION

Nelder design

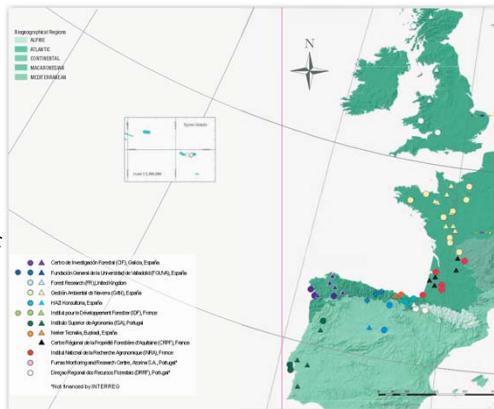


Figures: Uhl et al. (2015)

EXPERIMENTAL SITES



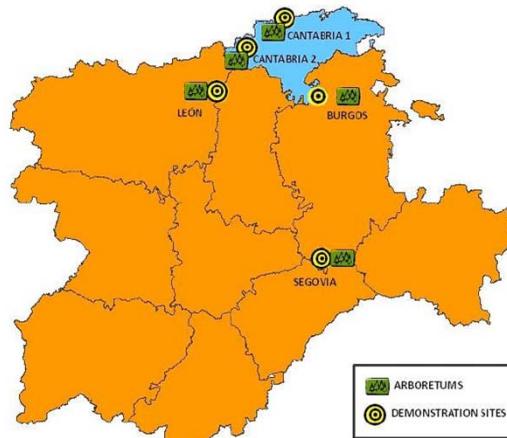
*REsource INFrastuctures for monitoring,
adapting and protecting european atlantic
FORests under Changing climateE*



8 arboreta to anticipate the impact of climate change on existing species

41 demonstration stands to compare current silvicultural practices with other
climate change adaptation techniques

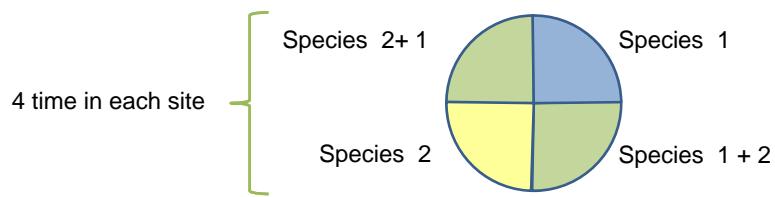
EXPERIMENTAL SITES



Setting up: 2012

Measures: 2013 and 2014

EXPERIMENTAL SITES

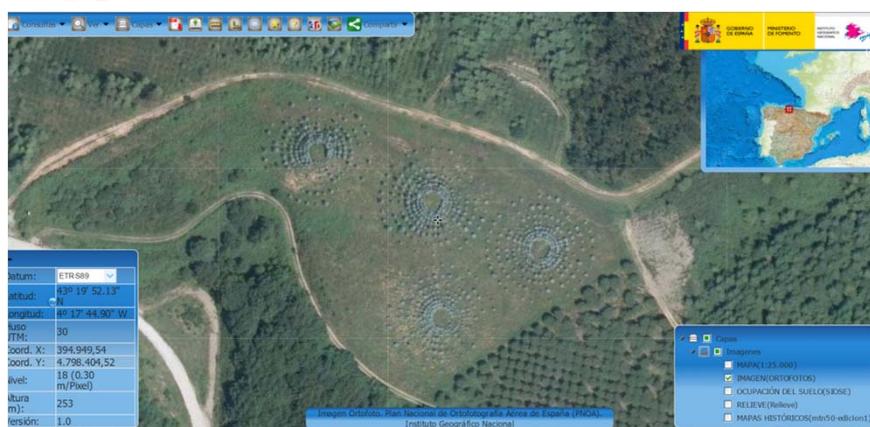


Site	Specie 1	Specie 2
CANTABRIA 1	<i>Eucalyptus nitens</i> I	<i>E. nitens</i> II (Resistant code to <i>Mycosphaerella</i> sp.)
CANTABRIA 2	<i>Pinus radiata</i>	<i>Pinus sylvestris</i>
LEÓN	<i>Pinus sylvestris</i>	<i>Quercus pyrenaica</i>
SEGOVIA	<i>Pinus pinaster</i>	<i>Quercus ilex</i>

EXPERIMENTAL SITES

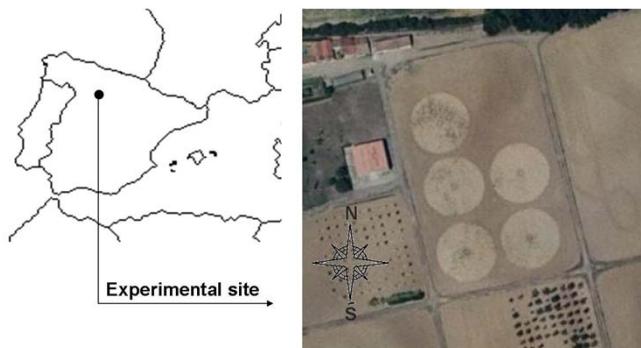


Setting up: 2012
Measures: 2013 and 2014



EXPERIMENTAL SITES

Natural regeneration of Mediterranean pines

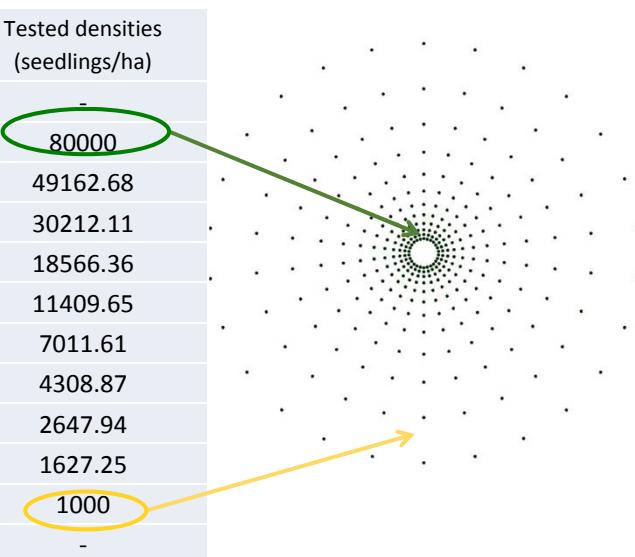


Setting up: 2013

Measures: 2014

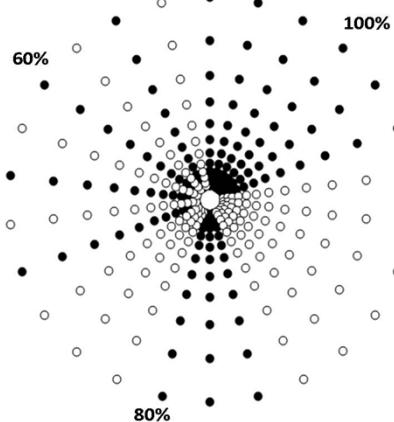
EXPERIMENTAL SITES

Ring	Radial length (m)	Tested densities (seedlings/ha)
0	1.14	-
1	1.45	80000
2	1.85	49162.68
3	2.36	30212.11
4	3.01	18566.36
5	3.84	11409.65
6	4.90	7011.61
7	6.25	4308.87
8	7.97	2647.94
9	10.17	1627.25
10	12.97	1000
11	16.55	-

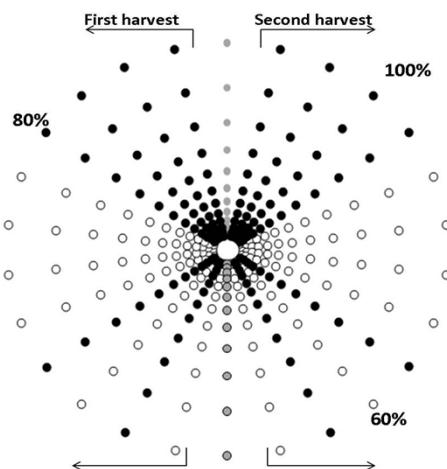


EXPERIMENTAL SITES

Permanent Nelder wheel plot



Temporal Nelder wheel plot

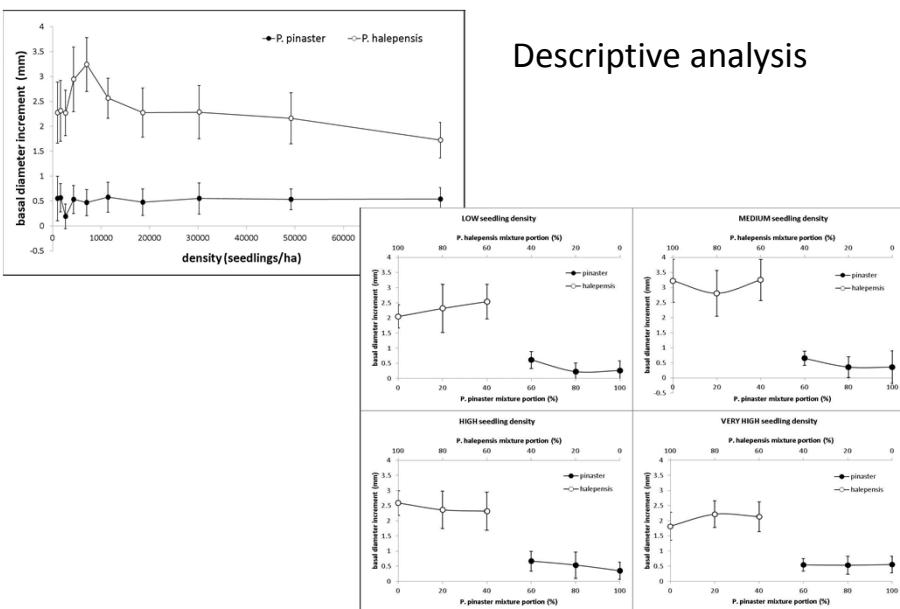


DATA



CURRENT SITUATION

Descriptive analysis



CURRENT SITUATION



Pinus pinaster



Pinus halepensis



CHALLENGES AHEAD

High mortality during first years



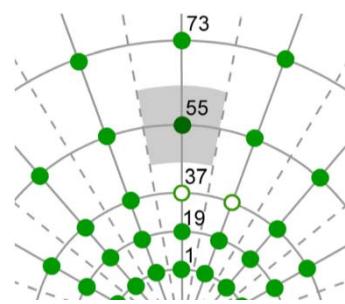
5.4 % dry seedlings



9.9 % died seedlings
9% lost of principal stem

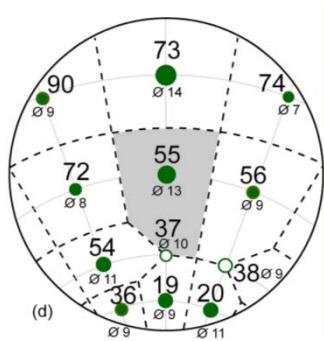


CHALLENGES AHEAD



Heghyi's index (1974)

$$C_i = \sum_{j=1}^{N(R)} (d_i/d_j)/Dist_{ij}$$



Figures: Uhl et al. (2015)

