

# WP2 work and preliminary results from Spain

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# Smallwood

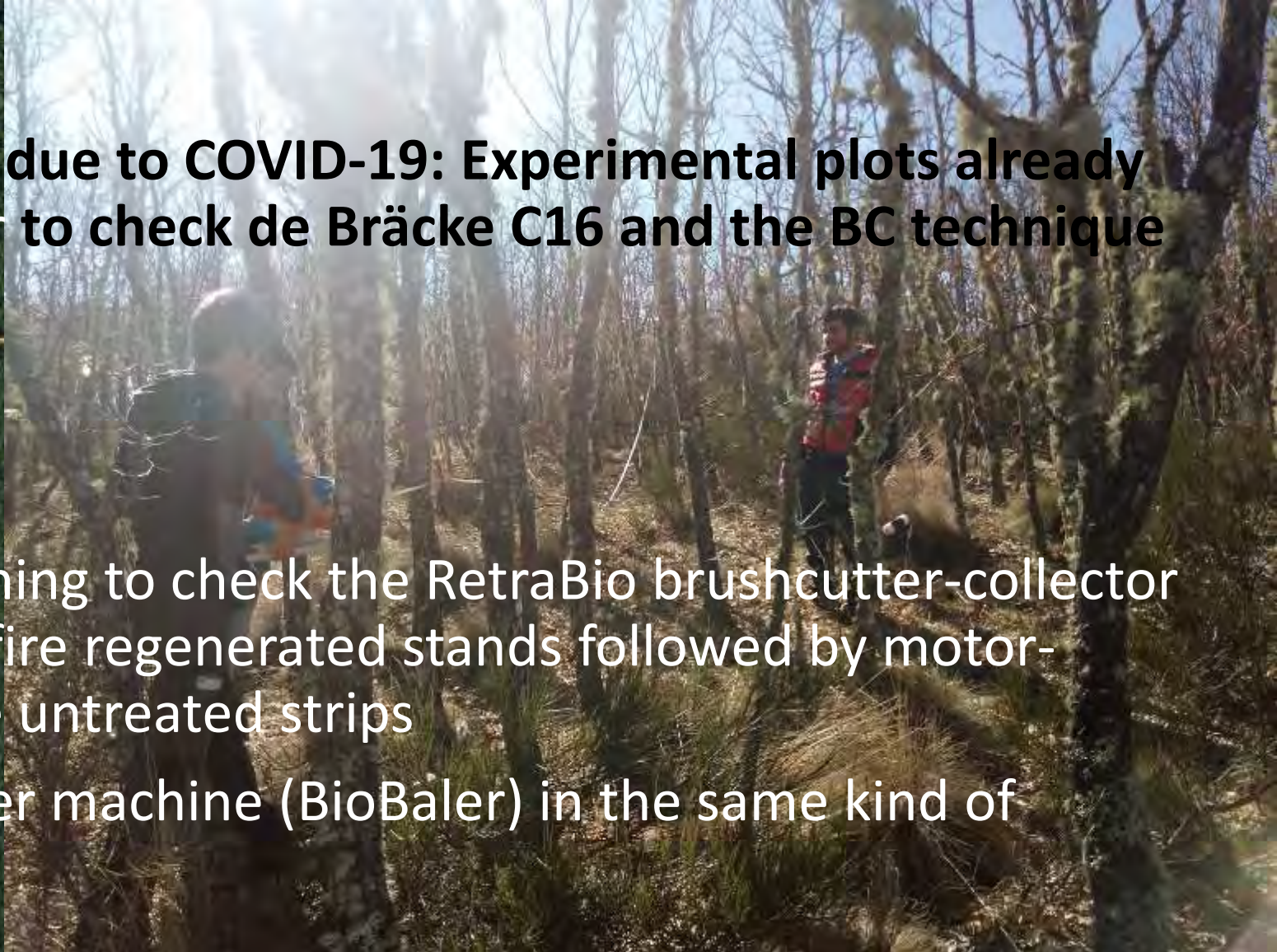
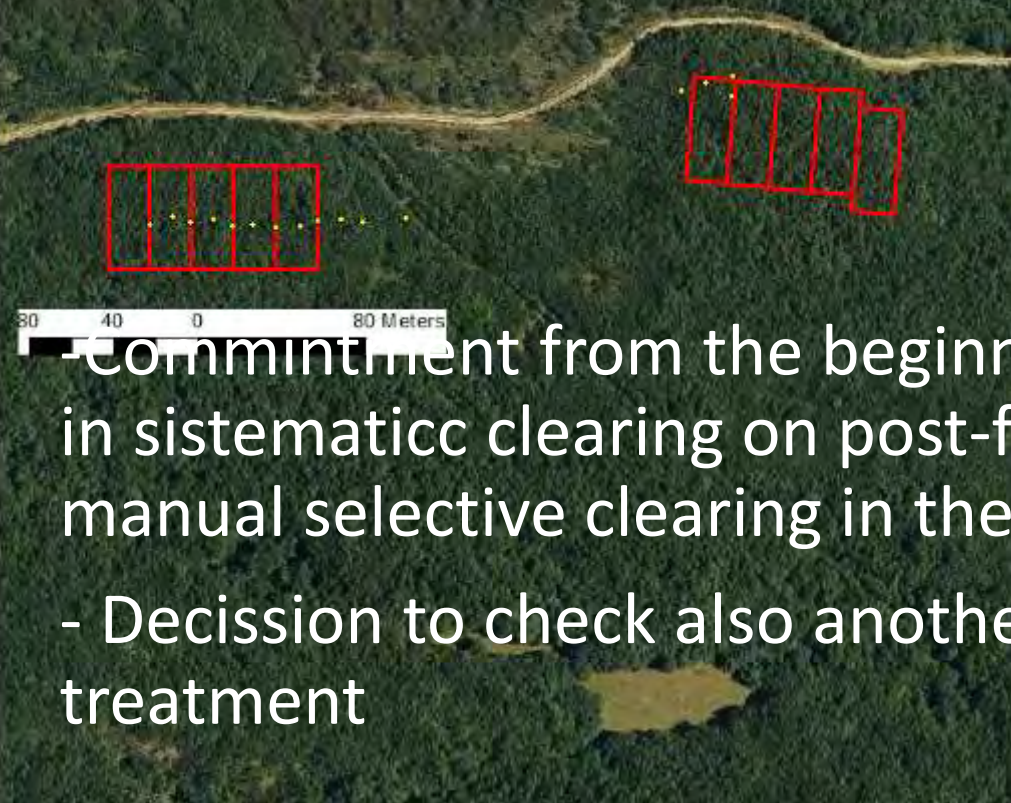


Smallwood is supported under the umbrella of ERA-NET Cofund ForestValue. ForestValue has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773324.



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- Particular situation in Spain, due to **COVID-19**: Experimental plots already inventoried in coppices in order to check de Bräcke C16 and the BC technique



- Commitment from the beginning to check the RetraBio brushcutter-collector in systematic clearing on post-fire regenerated stands followed by motor-manual selective clearing in the untreated strips
- Decision to check also another machine (BioBaler) in the same kind of treatment



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# Location



Retrabio -As Pontes (A Coruña)



Biobaler -Castrocontrigo (León)



# Retrabilio



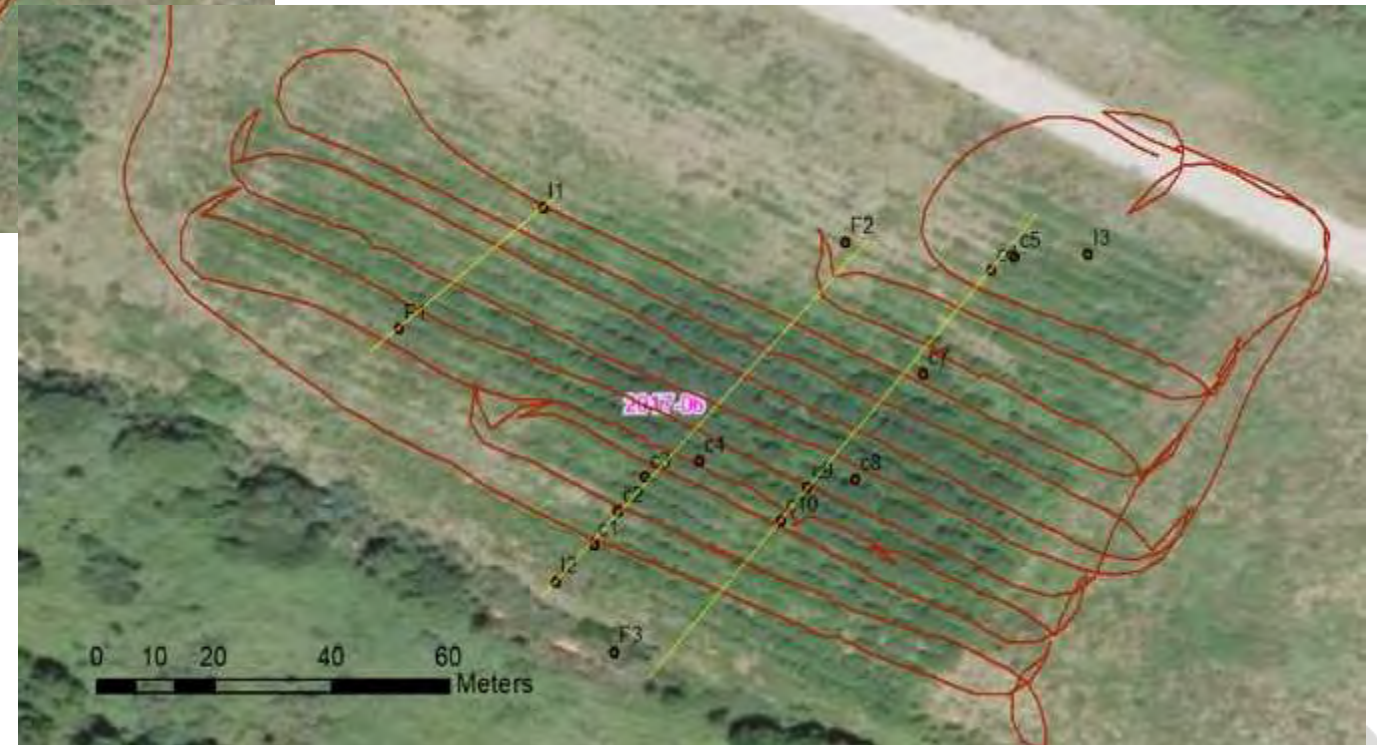
# Tasks (28 September- 2 October 2020)



- INVENTORY: 28 circular plots (2 m radius):
  - Stand conditions including scrubs
  - Weight of different *Salix* stools/moisture content samples
- Detailed – continuous - TIME STUDY
- Scaling extracted biomass /moisture content samples
- POST-TREATMENT INVENTORY ALONG TRANSECTS perpendicular to mulched strips: 26 circular plots (1 m radius):
  - Stand conditions after the treatment
  - Stand/soil damages characterization
  - Stump height and status
  - Weight of downed woody material/moisture content samples








Two subplots: 2.8 vs 3.7 m wide untreated strips



 DEMATIK  
Manufactured in the USA





# Preliminary results



Treated area (ha): 0.557

Odt/ha before treatment: 30.6

Machine speed while brushcutting (km/h): 0.8

Total travelled distance (m): 844

Extracted dry biomass (ODt): 2.77

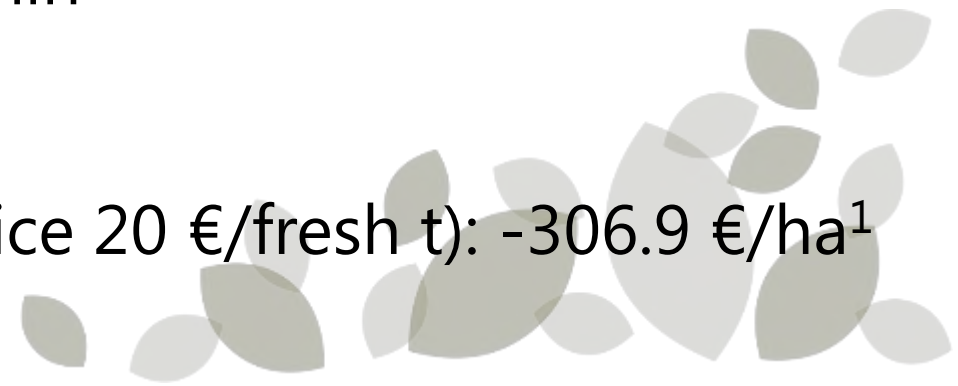
% Extracted/Cleaned biomass  $\approx$  45%

Productive machine hours (PM<sub>15</sub>h): 1 h 41 min

Productivity Odt/PM<sub>15</sub>h = 1.64

Economic Balance (for roadside biomass price 20 €/fresh t): -306.9 €/ha<sup>1</sup>

<sup>1</sup> Hourly costs from Esteban, L. S. *et al.*, 2017



# Productivity



$$P \text{ (ha/hProd)} = 1000 \cdot S \cdot (2.75 + d) / 10000$$

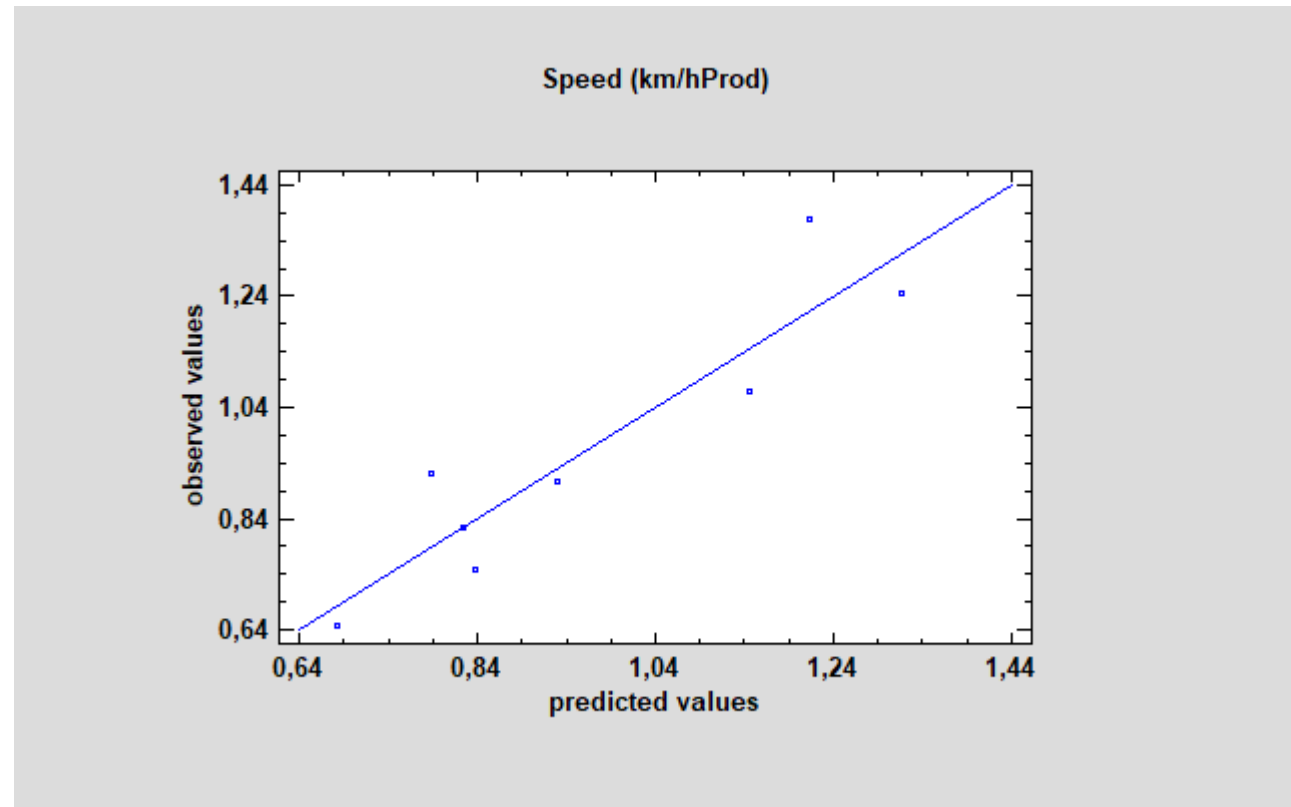
S = speed, km/h (Productive time)

d = untreated strip width (m)

$$S \text{ (km/h)} = 4.06 - 2.07 \cdot 10^{-5} \cdot N \text{ (trees/ha)} - 0.38 \cdot H_0 \text{ (m)} - 2.97 \cdot 10^{-3} \cdot \text{ShrubsCover}(\%) \cdot \text{ShrubsHeight}(\text{m})$$

$R^2 = 84.7\%$

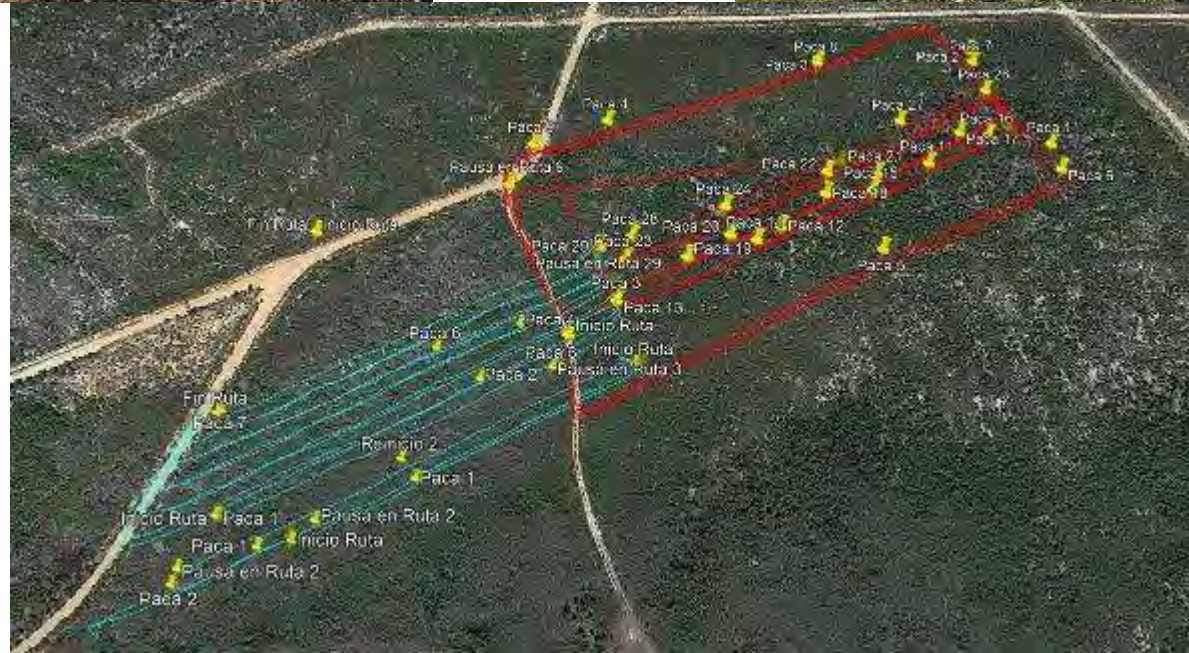
MAE = 0.075 km/hProd



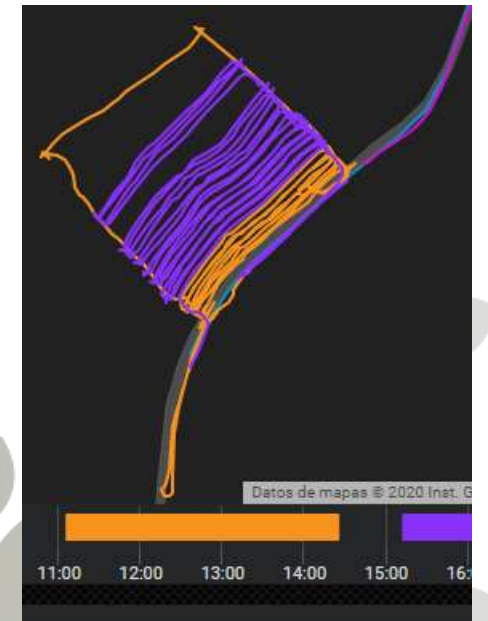
# Biobaler



# Site 1: Two plots with 1.4 vs 2.6 m wide untreated strips



# Site 2: : Other two plots with 1.6 vs 3.2 m wide untreated strips



# Tasks (October-November 2020)



- Sampling (frequency) time study
- Bundles geolocation and numbering / moisture content samples
- Post-treatment inventory along the strip roads:
  - Weight of downed woody material / moisture content samples
  - Average height and canopy cover of trees and shrubs
  - Stand/soil damages characterization
  - Stump height
- Scaling extracted biomass / moisture content samples



# Preliminary results



Treated area with BioBaler: 7.15 total ha (4.36 ha cleaned)

Dry tonnes / bale (ODt): 0.179

Machine speed while brushcutting-bundling (km/h): 2.75

	1 Narrow	1 Wide	2 Narrow	2 Wide
Width (m) of untreated strips	1,4	2,6	1,6	3,1
Biovolume, Cover%·Hm,m (trees)	21	92	11	31
Stump diameter (cm)	1.1	3.2	1.6	1.8
ODt/ha before treatment	4,3	8,3	5,1	4,6





# Results

## BIOBALER



### MAIN FIGURES

	ZONE 1		ZONE 2	
	Narrow	Wide	Narrow	Wide
<b>Extracted dry biomass (Odt/ha)</b>	<b>1,3</b>	<b>3,4</b>	<b>1,4</b>	<b>0,9</b>
<b>% Extracted/Cleaned biomass</b>	<b>30</b>	<b>42</b>	<b>33</b>	<b>20</b>
<b>Travelled distance/bale (m)</b>	<b>246</b>	<b>89</b>	<b>320</b>	<b>264</b>
<b>ODt/h (SMH)</b>	<b>1 (a)</b>	<b>2,5 (b)</b>	<b>1,2 (a)</b>	<b>0,9 (a)</b>
<b>ha/h (SMH)</b>	<b>0,6 (a)</b>	<b>0,7 (ab)</b>	<b>0,8 (ab)</b>	<b>0,9 (b)</b>

# BIOBALER

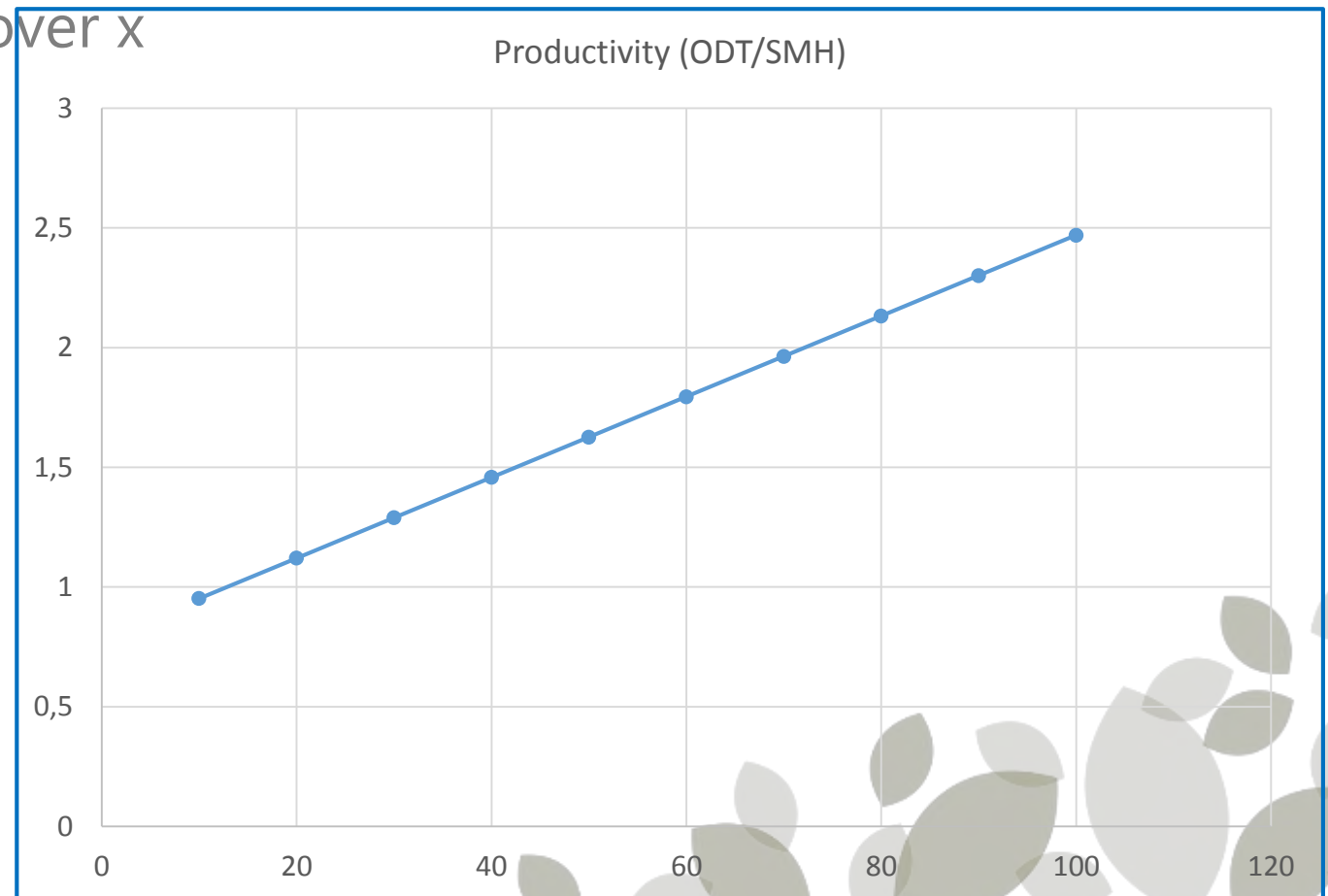
## Productivity



$$P \text{ (OD t / h SMH)} = (783,45 + 16,86 \text{ height}) / 1000$$

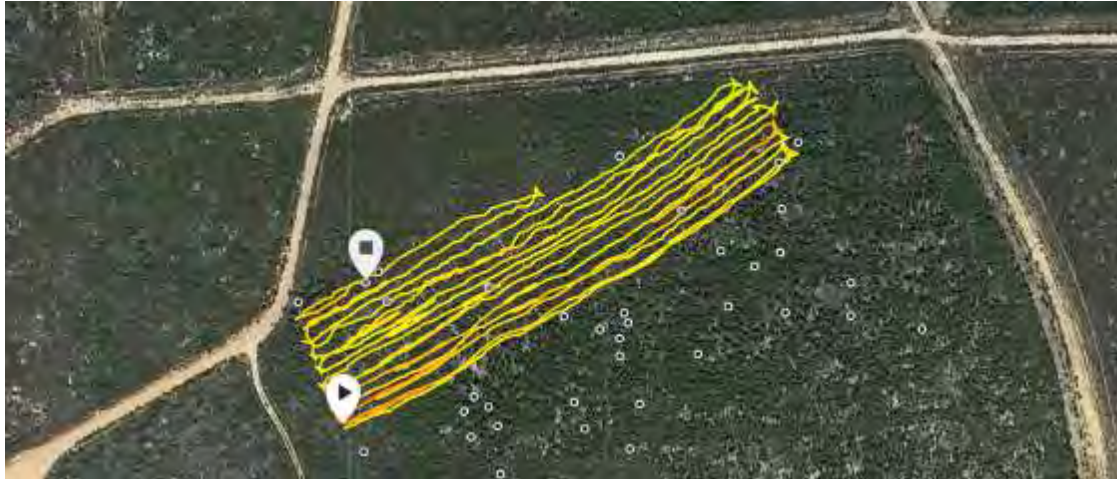
$R^2 = 53,5$

PB= Pine biovolume (canopy cover x



# CHAIN MULCHER STUDY PLOTS

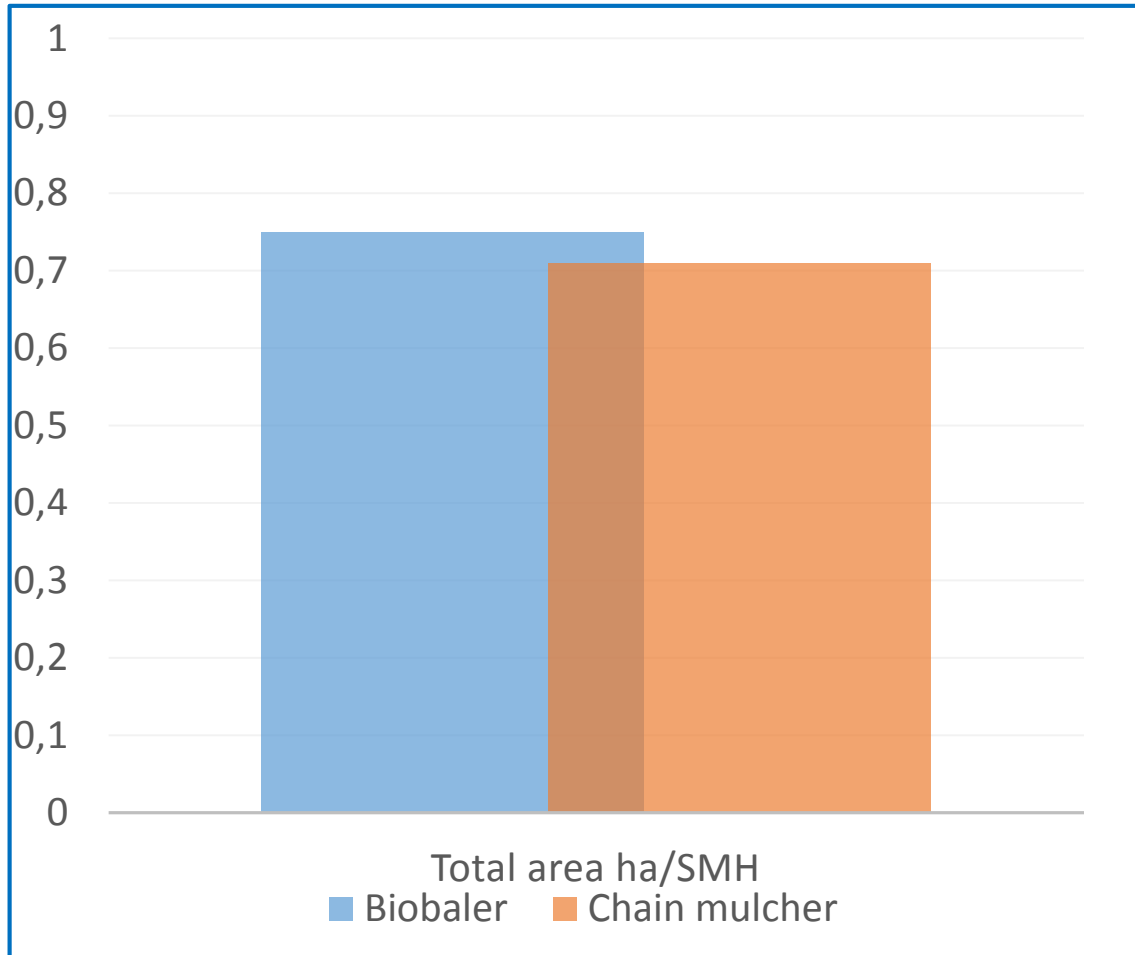
2 Sites, 2 Wide and narrow strips strata per site (surface treated: 2.32 out of 4.70 total ha)



# BIOBALER VS CHAIN MULCHER PRODUCTIVITY



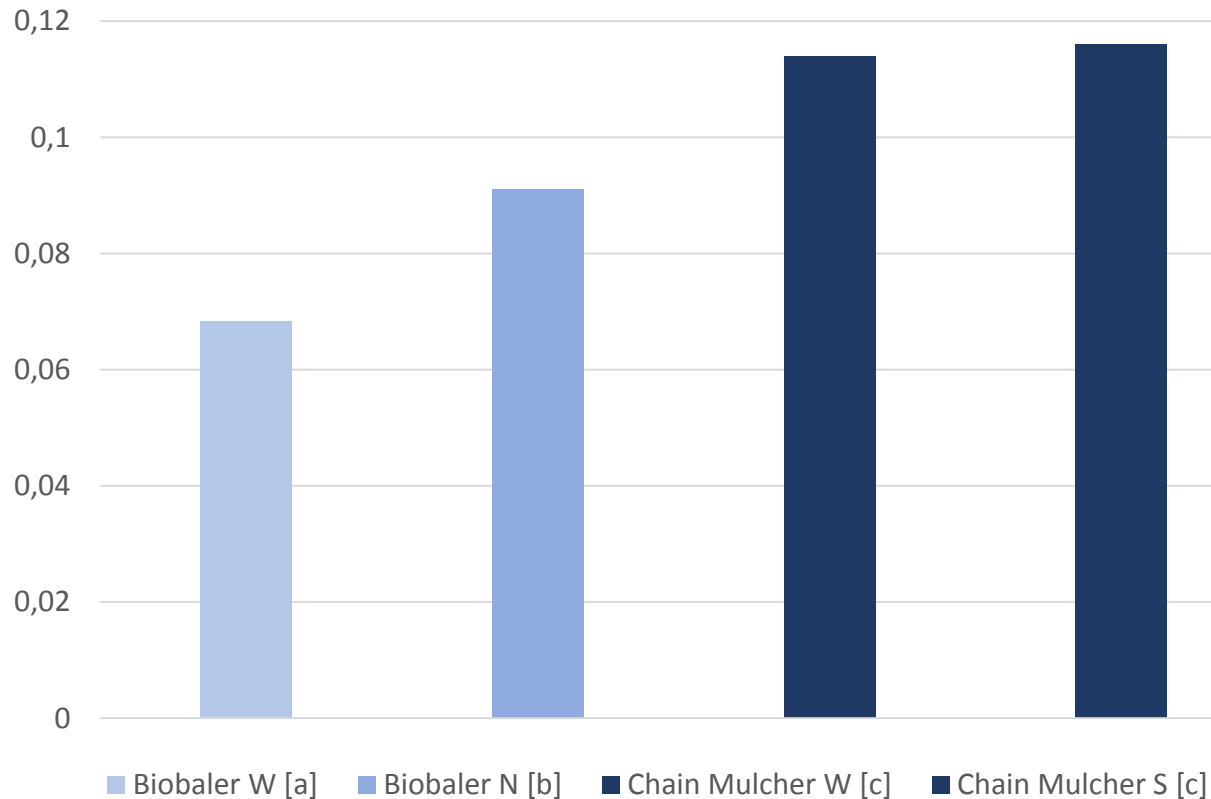
Surface per SMH



# Statistical analysis of manual clearing

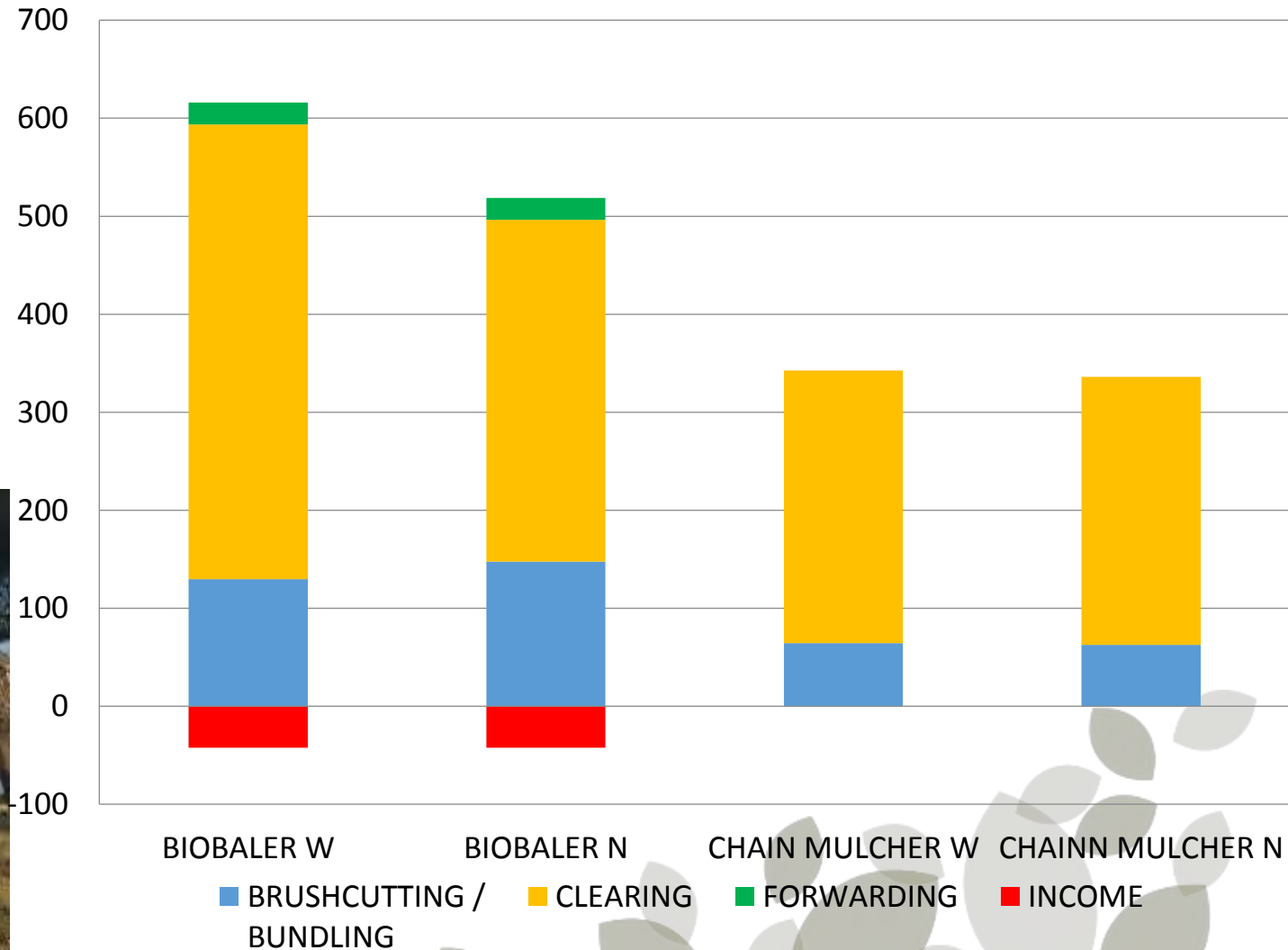


Productivity: Total Surface (ha) per SMH and worker (team of 4 workers equipped with clearing saws)



# COST

€/ha for the 4 tried alternatives



# ACKNOWLEDGEMENTS



- CIS-MADEIRA Galician Research Center (Dr. G. Piñeiras & RetraBio driver)
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