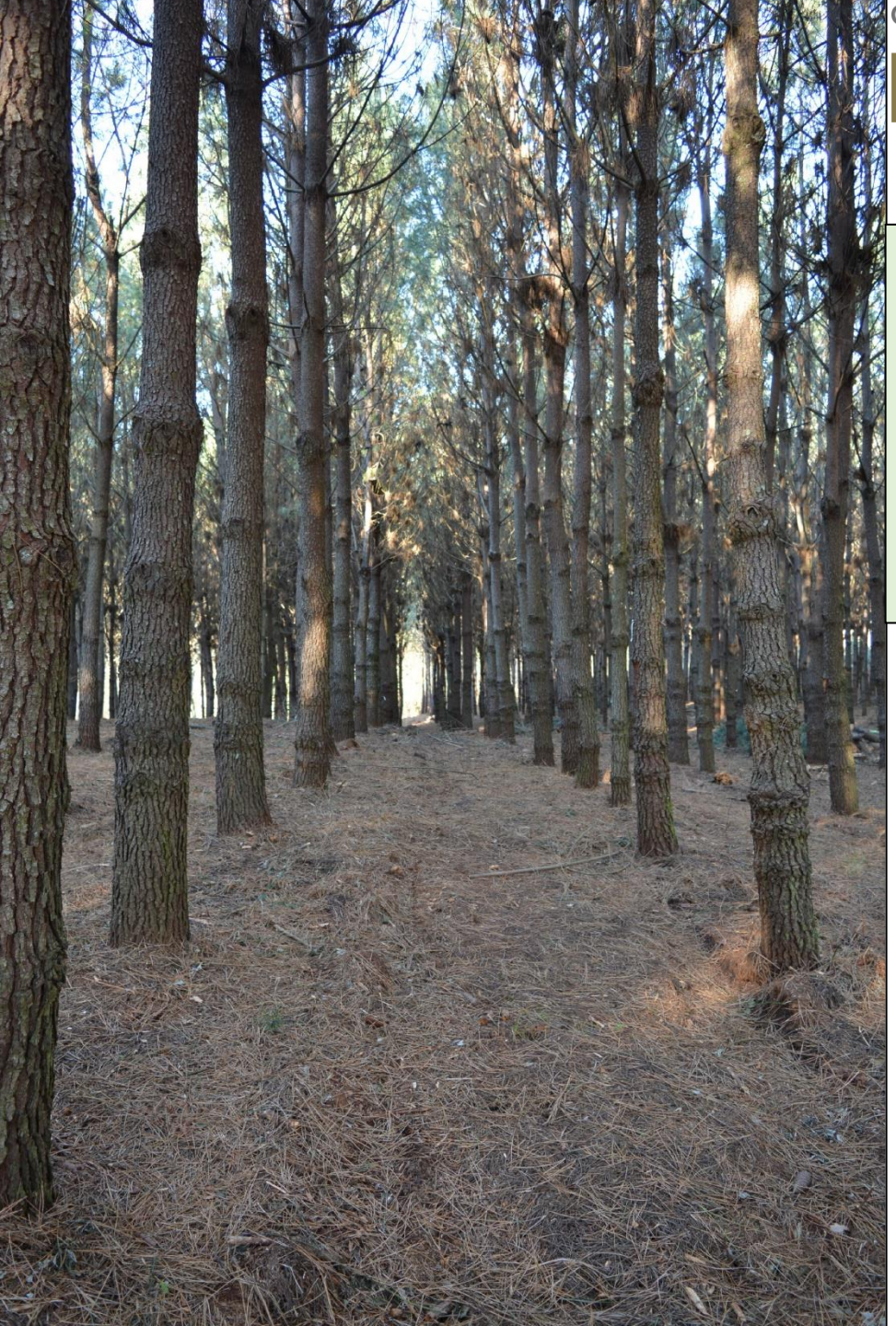


Centro de Investigación Forestal
LOURIZÁN

AXENCIA GALEGA DA CALIDADE ALIMENTARIA

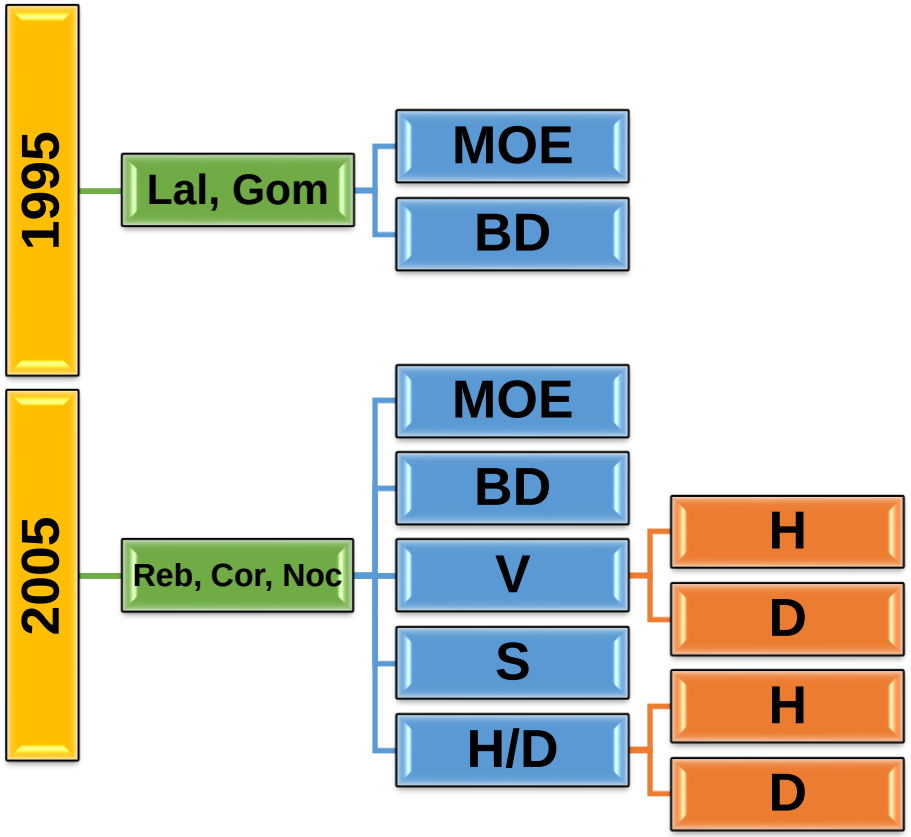
Xacobeo 21·22

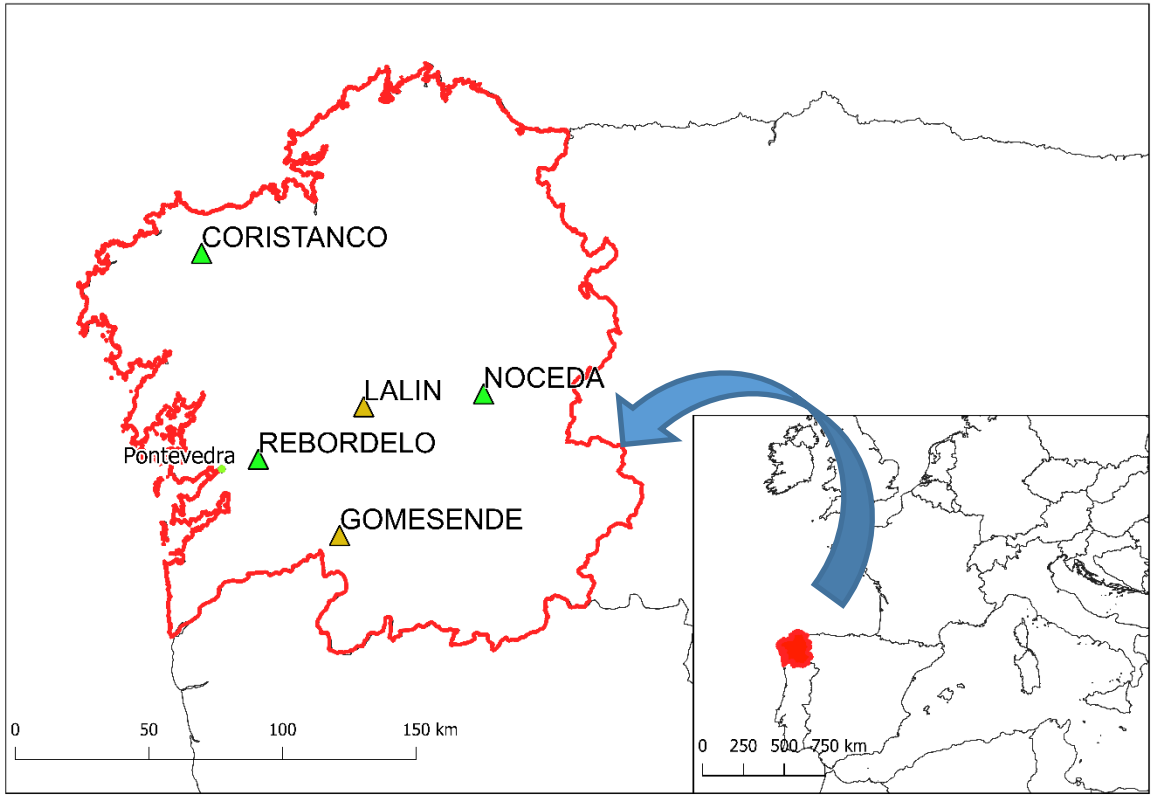
Is it possible to select according to wood quality and growth in *Pinus pinaster*? Case study of Galician breeding population

Esteban Torres-Sánchez, Eva Prada, Lucía Villar, Raquel Díaz-Vázquez

B4EST International Conference 20-23 June 2022. Lisbon. Portugal

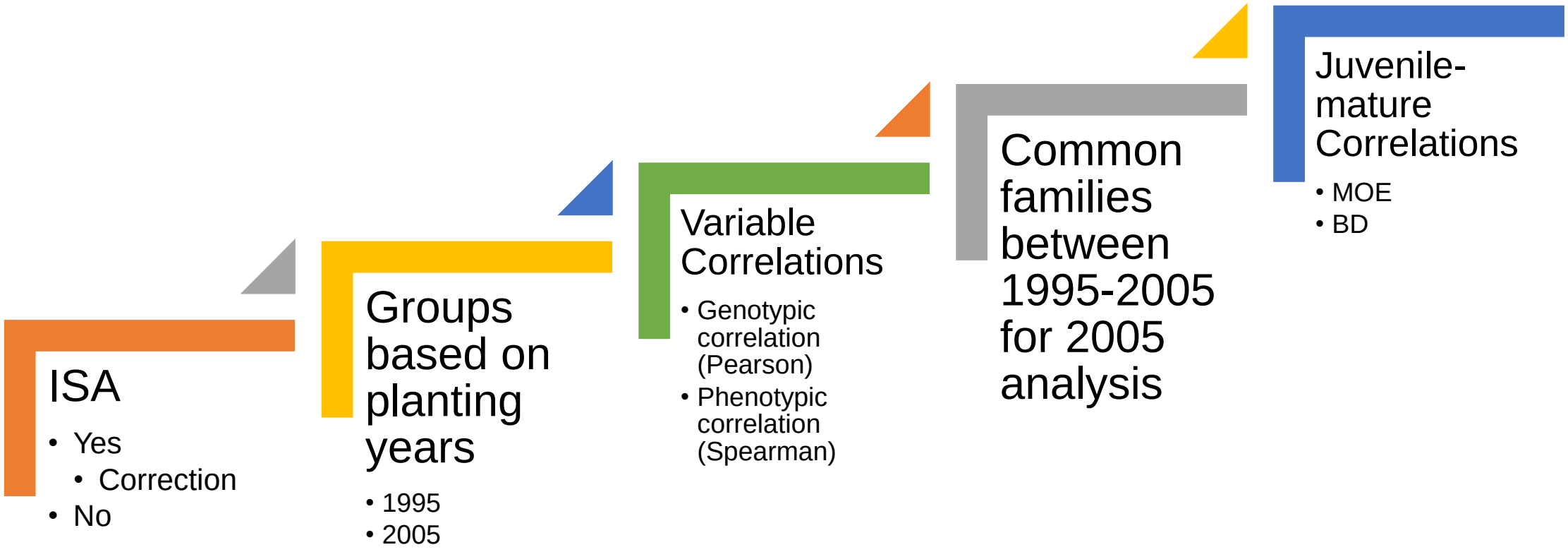
Experimental trials





Lal: Lalín; Gom: Gomesende; Reb: Rebordelo; Cor: Coristanco; Noc: Noceda; MOE: modulus of elasticity (Mpa); BD: basic density ($Kg*m^{-3}$); V: volume (dm^3); S: straightness (scale); H/D: slenderness ($m*cm^{-1}$); H: height (m); D: diameter at breast height (cm)

Analysis data



Results

Year		μ	CV (%)	*Site*	*Genotype*	*Genotype x Site*	h_i^2	h_f^2
2005	**BD**	411.75	7.98	***	***	n.s.	0.44	0.87
	MOE	10909.27	22.16	***	***	n.s.	0.36	0.85
	S	4.70	22.19	***	**	n.s.	0.11	0.65
	V	126.16	53.29	***	***	*	0.13	0.61
	H/D	57.05	16.57	***	*	n.s.	0.07	0.53
1995	**DB**	448.80	8.80	***	**		0.24	0.65
	MOE	14870.66	19.78	***	***		0.39	0.76

Lal: Lalín; Gom: Gomesende; Reb: Rebordelo; Cor: Coristanco; Noc: Noceda; MOE: modulus of elasticity (Mpa); BD: basic density ($Kg*m^{-3}$); V: volume (dm^3); S: straightness (scale); H/D: slenderness ($m*cm^{-1}$); H: height (m); D: diameter at breast height (cm)

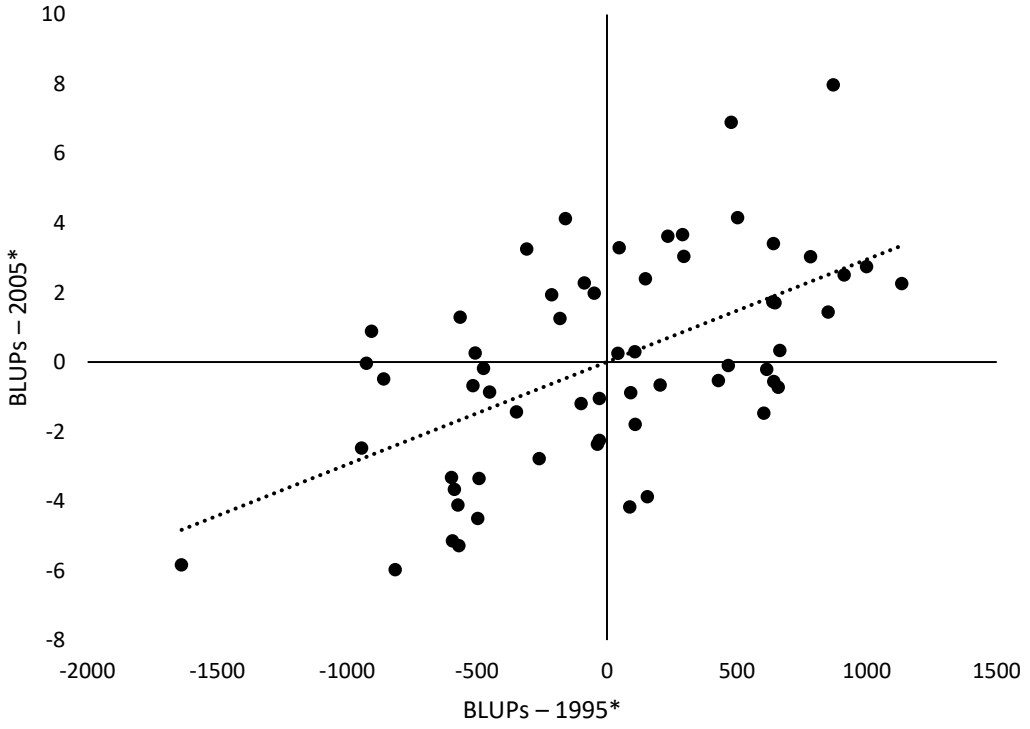
Variable Correlations

Year		Variable	Spearman; Phenotypic correlation BD	H/D	MOE	S	V
2005	Pearson; Genetic correlation	BD			**0.40*** **		-0.22***
		H/D			0.28***	-0.07***	-0.51***
		MOE	**0.21***	0.32***		-0.11***	-0.22***
		S					-0.12***
		V		-0.75***			
1995	Pearson; Genetic correlation	BD			**0.43*** **		
		MOE	**0.46*** **				

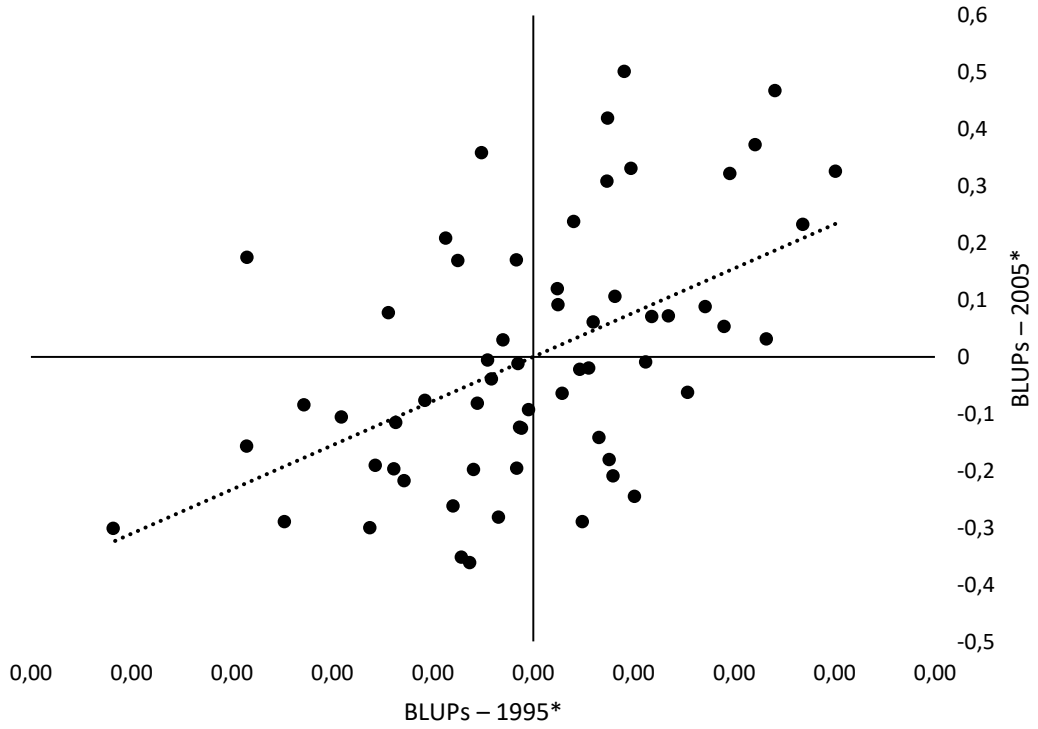
Lal: Lalín; Gom: Gomesende; Reb: Rebordelo; Cor: Coristanco; Noc: Noceda; MOE: modulus of elasticity (Mpa); BD: basic density ($Kg*m^{-3}$); V: volume (dm^3); S: straightness (scale); H/D: slenderness ($m*cm^{-1}$); H: height (m); D: diameter at breast height (cm)

Juvenile-mature correlations

MOE - $\gamma_{juvenile-mature}=0.57^{***}$

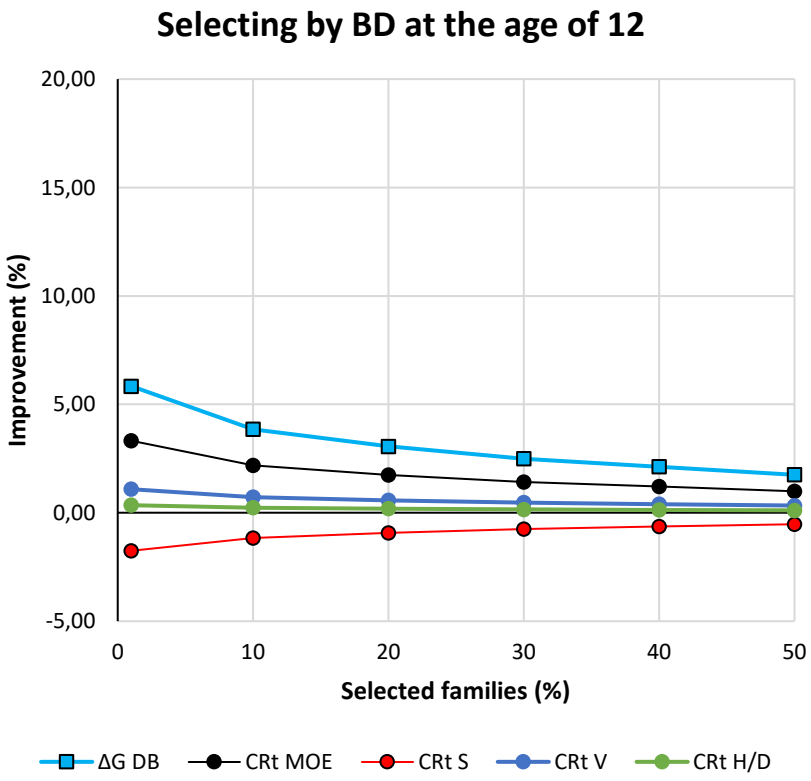


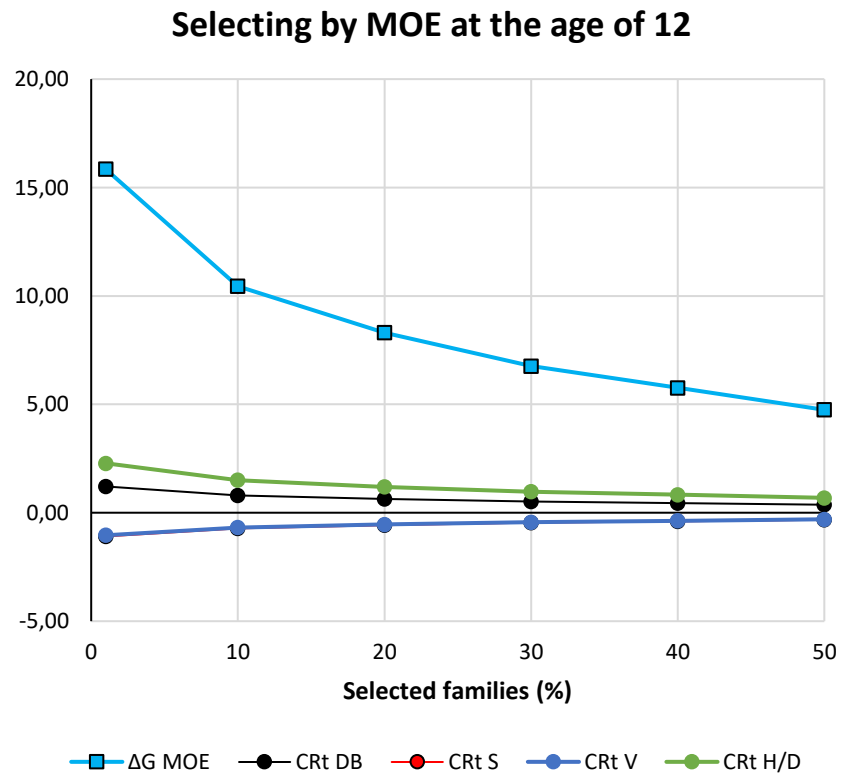
BD - $\gamma_{juvenile-mature}=0.51^{***}$

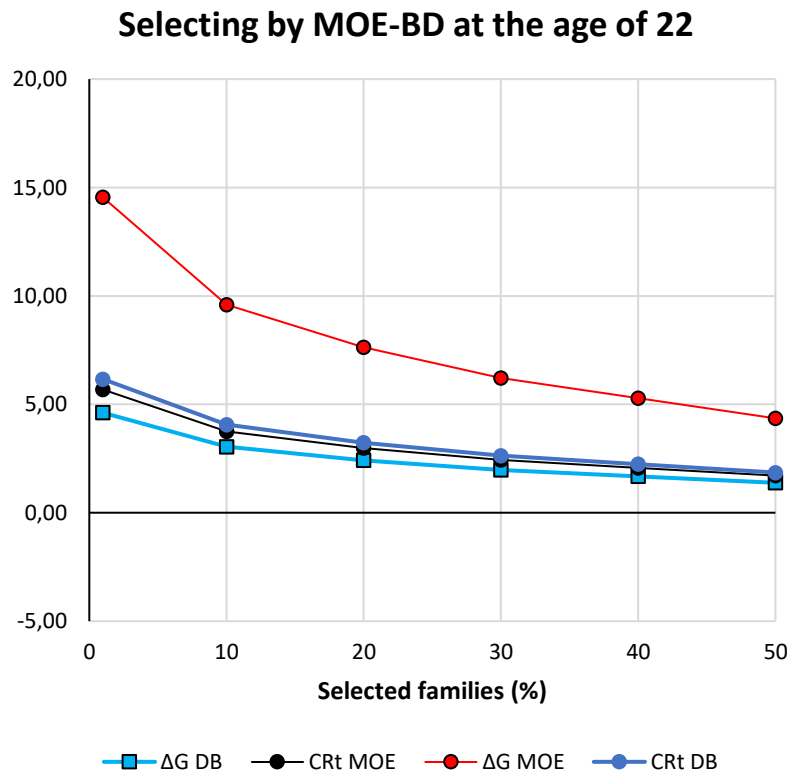


*Y - X-axis: BLUPs are represented in a scale according transformation function to achieve normality and homocedasticity in the residuals

Selecting by the best families







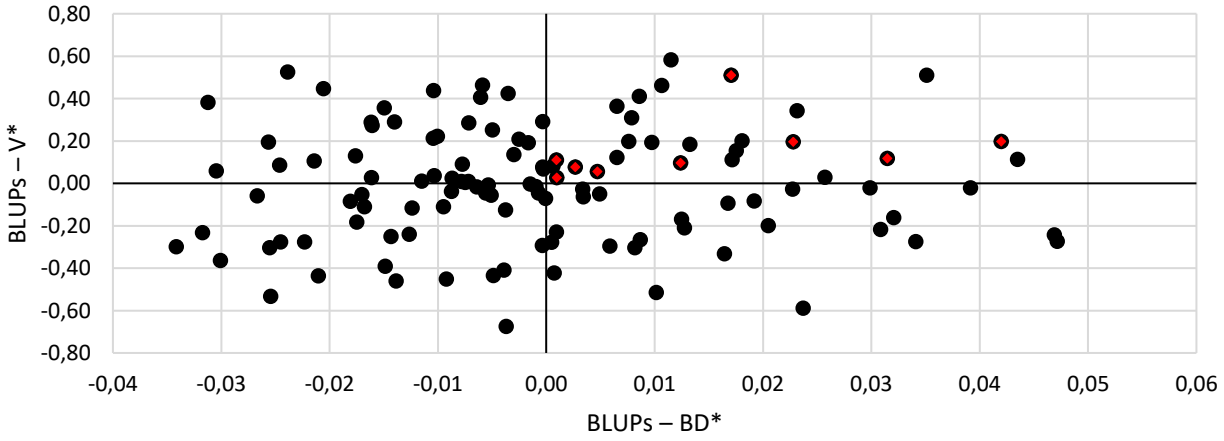
$$\Delta G(\%) = i * h_f^2 * CV(\%)_f$$

$$CR_t(\%) = i * \sqrt[2]{h_{af}^2} * \sqrt[2]{h_{tf}^2} * CV(\%)_{tf} * \gamma_{at}$$

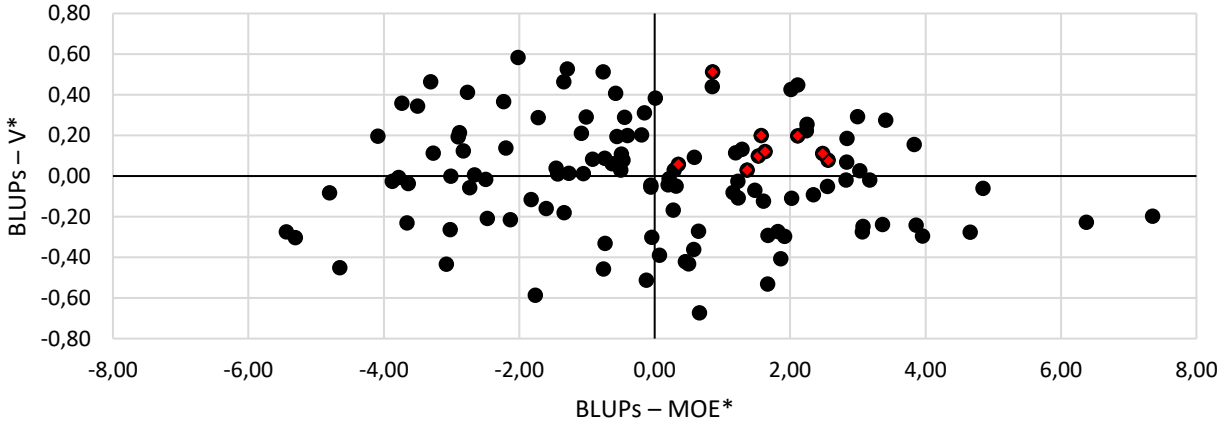
$\Delta G(\%)$: genetic gain in percentage; $CR_t(\%)$: correlated response of variable "t" according to the genetic gain of variable "a" in percentage; i: selection intensity; h_f^2: family heratibility; $CV(\%)_f$: family variation coefficient in percentage; h_{af}^2: family heratibility of variable "a"; h_{tf}^2: family heratibility of variable "t"; γ_{at}: genetic correlation between variable "a" and variable "t"

Selecting by specific families - 2005

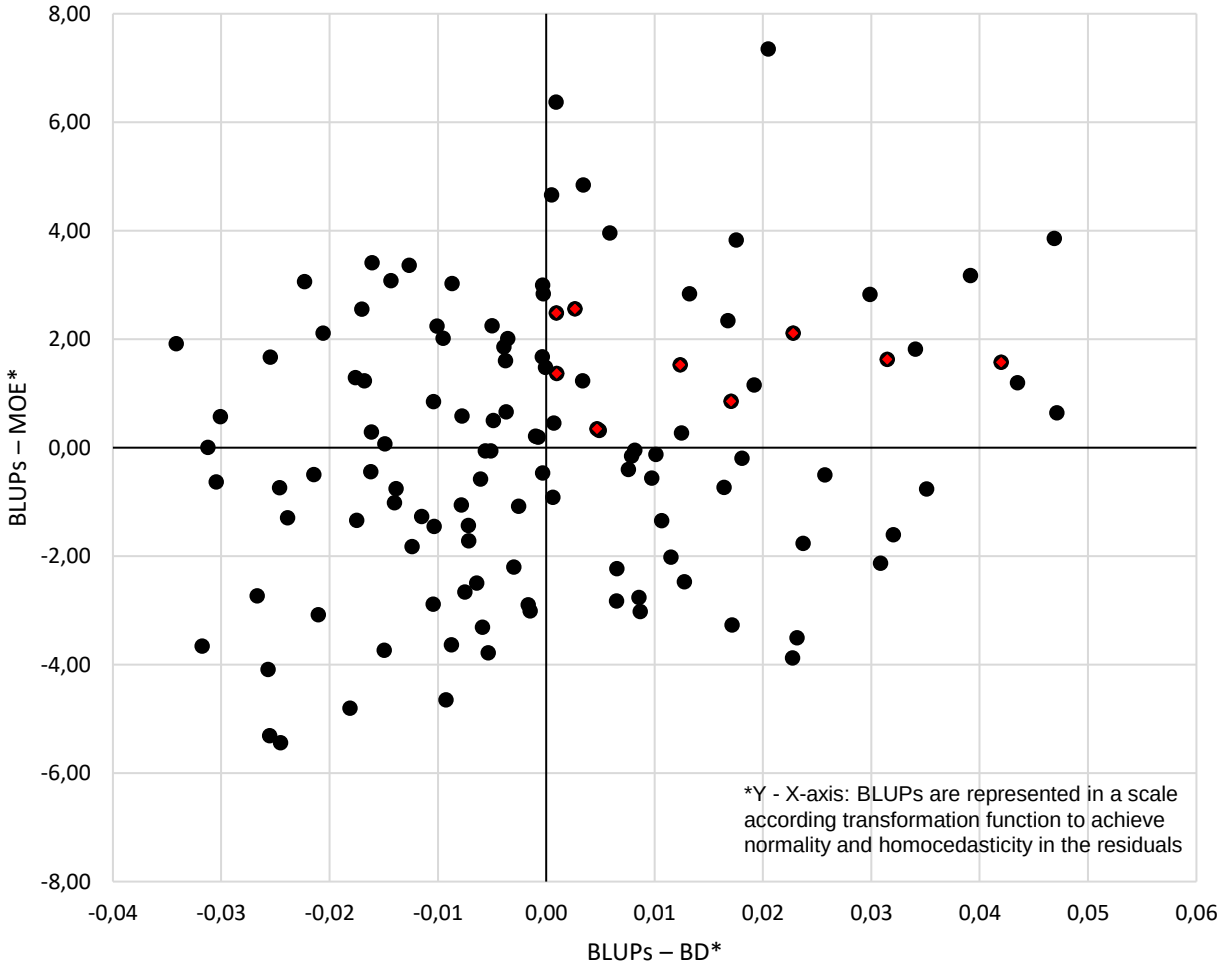
Relation BD - V



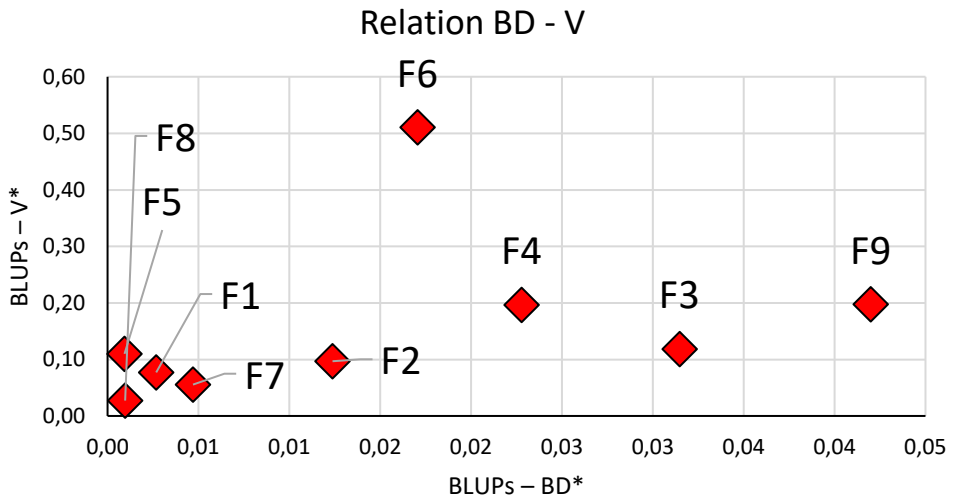
Relation MOE - V

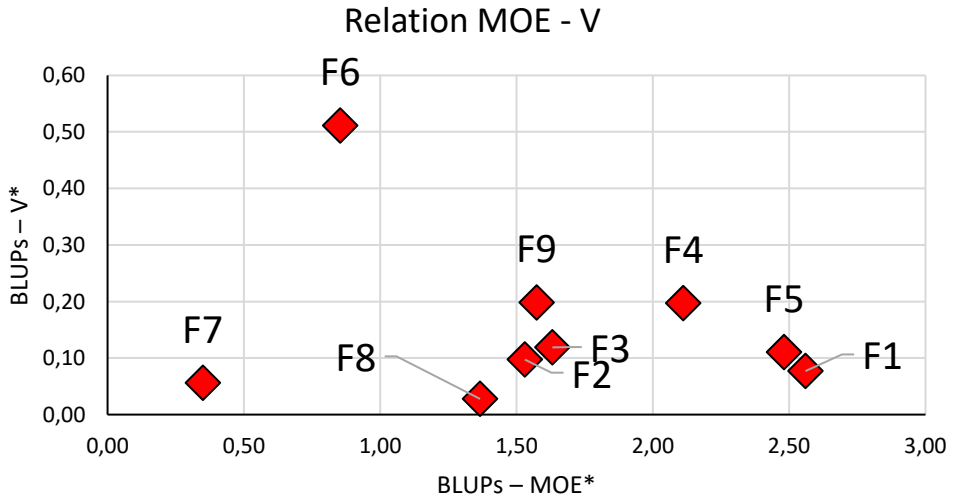


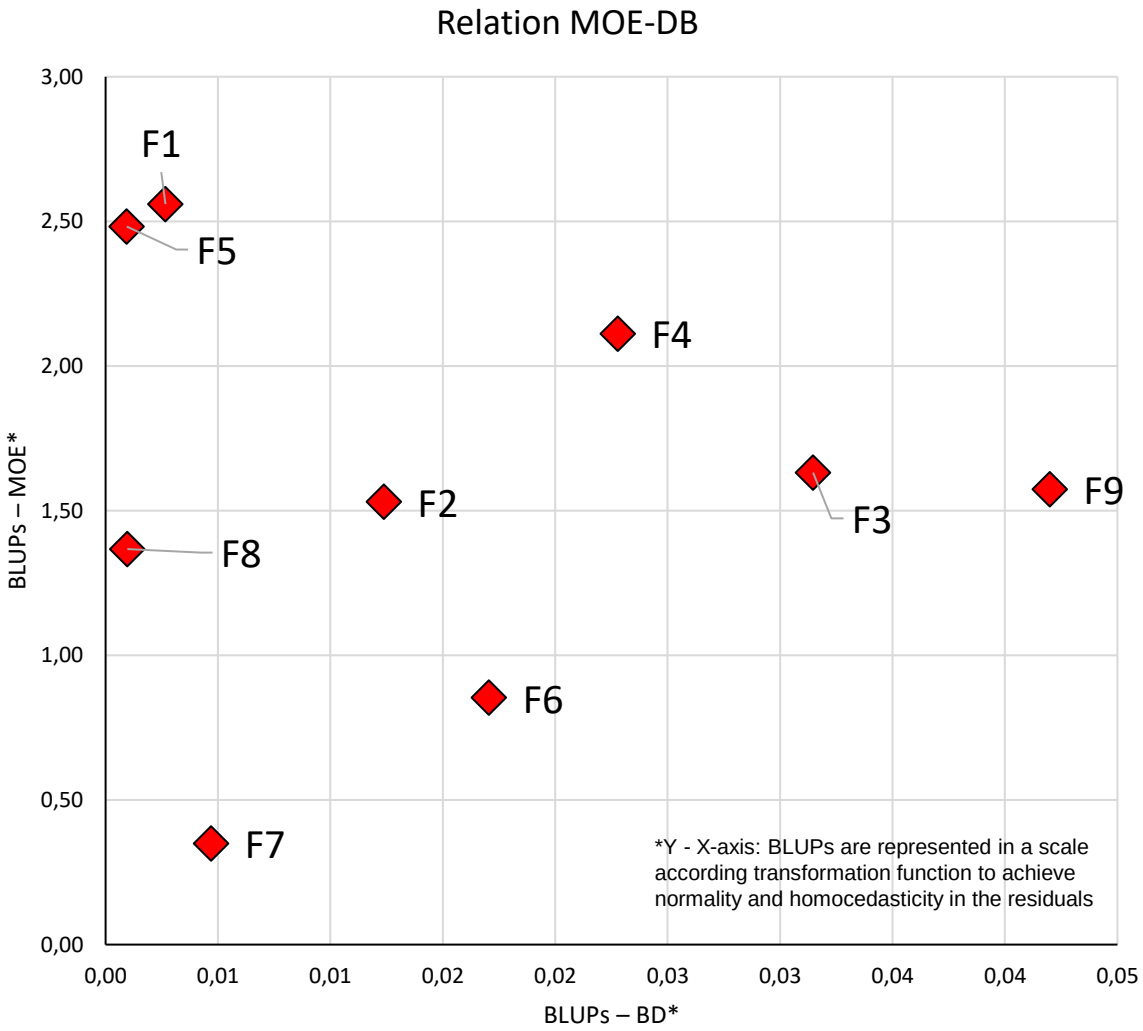
Relation MOE - BD



Selecting by specific families - 2005







Conclusion

- Selecting families of interest to improve wood quality with no growth loss is possible.
- Selecting wood quality at an early stage is promising due to juvenile-mature correlations.
- The percentage of improvement in all variables varies depending on selection by MOE or DB.