

**Supplemental table: summary of breeding strategies**

Estimation of expected genetic gains for girth (GBH), height (HT) and stem sweep (SWE) in virtual clonal seed orchards (CSO) established from different breeding strategies: forward selections (from preselection strategies S1 or S2) with either no restriction on Ns (top12), or Ns=10 or Ns=20; backward selection with constraint on Ns (10 or 20); mixed selections with constraint on Ns (10 or 20). Optimization of selection was done with OPSEL software. The target census size of the selected population (total number of ramets constituting the CSO) was set at 600. The number of ramets available per genotype was set at 50 for G2 trees and 200 for G1 trees.

Final selection strategy	Forward Top12 G2		Forward with restriction on Ns				Backward with restriction on Ns		Mixed (FOR_BACK) with restriction on Ns			
	No restriction		Ns=10		Ns=20		Ns=10	Ns=20	Ns=10		Ns=20	
Restriction on status number (Ns)	P51	P52	P51	P52	P51	P52			P51	P52	P51	P52
Preselection option	12 best G2	12 best G2	122 G2	125 G2	122 G2	125 G2	166 G1	166 G1	122 G2 + 166 G1	125 G2 + 166 G1	122 G2 + 166 G1	125 G2 + 166 G1
Number of genotypes available	12	12	37	20	77	57	23	43	37 (31 G2 and 6 G1)	26 (19 G2 and 7 G1)	77 (58 G2 and 19 G1)	63 (51 G2 and 12 G1)
Number of ramets/genotype (mean(min-max))	50 (50-50)	50 (50-50)	16.2 (2-49)	30 (2-50)	7.8 (1-22)	10.6 (1-31)	26.1 (1-113)	13.9 (1-55)	16.3 (1-107)	23.1 (1-114)	7.8 (1-39)	9.6 (1-47)
Average index of the CSO	3.3	3.2	3.1	3.1	2.8	2.8	3.0	2.6	3.2	3.2	2.9	2.9
Genetic gain for GBH at age 12 (in %)	15.8	16.3	15.1	15.1	13.3	13.3	14.6	12.2	15.4	15.7	13.5	13.7
Genetic gain for HT at age 12 (in %)	15.8	15.9	14.8	15.1	13.1	13.1	13.6	11.6	15.0	15.2	13.2	13.2
Genetic gain for SWE at age 8 (in %)	31.8	29.2	30.6	29.5	28.5	27.4	29.2	26.4	32.0	31.6	29.2	28.8