# Genetic parameters and QTL analysis of 13C and ring width in maritime pine

## Abstract

cellulose carbon isotope composition (13C, a time integrated estimate of water use

 (1),

where *Rsa* and *Rsd* are the 13C/12C ratios of the sample and the standard, respectively.

### Estimation of genetic parameters

following model derived from the “Henderson III” model (Searle 1971):

Yijk= µ + Bi + Fj + εijk (2)

where Yijk is the value of the trait for the individual k belonging to the family j, located in the block i, Bi is the fixed effect of the ith block, Fj is the random effect of variances are: σ²A=4σ²a and σ²D=4σ²s , whereas the phenotypic variance is : σ²P=σ²(Yijk)=2σ²a+2σ²s+σ²ε .The narrow and broad sense heritabilities were Table 4

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | map | Chra | Nb | Position ± SDc | Lod | P-valued | Dir.e | R² | R**2total** |
| 13C | male | 3a | 149 | 4.3±13.2 | 1.78 | 0.021\* | + | 0.047 | 0.268 |
| male | 6 | 164 | 102.7±21.6 | 4.40 | 0.001\*\*\* | + | 0.124 |
| male | 8 | 85 | 0.0±15.7 | 1.85 | 0.021\* | - | 0.050 |
| male | 9 | 183 | 104.6±28.5 | 1.90 | 0.033\* | - | 0.047 |
| female | 2 | 84 | 209.1±56.4 | 2.30 | 0.019\* | + | 0.065 | 0.246 |
| female | 5 | 164 | 99.9±22.0 | 1.98 | 0.0033\*\*\* | - | 0.062 |
| female | 12 | 153 | 1: 0.0±36.72: 135.4±27.1 | I : 4.24II: 1.88 | I : 0.002\*\*\*II: 0.036\* | -+ | 0.119 |
| MRW | male | 2b | 180153 | 1: 47.2±15.92: 51.8±11.1 | I : 2.49II: 1.57 | I : 0.048\*II: 0.027 | -+ | 0.181 | 0.429 |
| male | 5 | 145 | 56.8±33.4 | 2.41 | 0.022\* | - | 0.065 |
| male | 6 | 174168 | 1: 7.5±31.02: 133.7±22.0 | I : 4.24II: 2.68 | I : 0.001\*\*\*II: 0.002\* | -+ | 0.124 |
| male | 11 | 165 | 11.6±30.9 | 1.73 | 0.040\* | + | 0.059 |

a chromosome ID

## Figure 1 a

a)

