Breeding wood quality: from average corewood value to early bloomers

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During most of the life of tree breeding programs the emphasis has been to breed for growth, form and adaptation purposes (like disease or drought tolerance). This focus has shown a primary concern with quantity rather than quality of wood, despite of profitability being heavily influenced by the latter.

Two of the main issues that have delayed breeding for solid wood products are thinking of basic density as the canonical wood trait and aiming for average corewood value rather than for the onset of acceptable quality wood. Instead of relying on basic density, this study considers two quality thresholds in *Pinus radiata*: modulus of elasticity (MoE) greater than 8 GPa for stiffness and microfibril angle (MFA) lower than 35 degrees for stability. In addition, the target variable for analysis is the first ring where both quality criteria are met, rather than an average value for n rings. Values after onset are ignored in this approach because: i- once trees reach the threshold values, later rings tend to meet those values, ii- the effect of stiffness on price is non-linear and with maximum marginal effect when moving from industrial use to structural grade (7-8 GPa), and iii- *Pinus radiata* produces a large proportion of low value wood that does not reach structural grade. The first two reasons allow us to ignore age-age correlations.

There is a reasonable amount of genetic variation (CV 12%) and degree of genetic control ($h^2 = 0.45$) for the onset of the combined criteria. The difference between the best and worst families for the onset of acceptable quality is over three rings. Correlations between onset and quality are also discussed in the paper. This study suggests that breeding for average corewood value is not necessary. In fact, breeding for early expression of acceptable thresholds for wood quality is both desirable and feasible.

Key Words

wood quality, stiffness, stability, pinus radiata, genetic parameters, early selection.