Impact of growth rate on the distribution of visually strength-graded West-European Douglas-fir boards

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Douglas-fir is a relatively new species within the forest landscape of Wallonia (Southern Belgium). Consequently, some uncertainties remain regarding how to keep full advantage of its high productivity as well as of the good properties of its wood. Moreover, the recent implementation of the timber strength grading (Council Directive 89/106/EEC) is likely to sensitize forest managers and the sawing industry to the impact of sylviculture on the resource quality.

In that context, this research aimed at assessing to what extent the ring width of the trees (RW_{tree}) and the mean girth increment of the stands (MGI) influences, in the frame of a visual strength grading, the distribution of the boards they produce.

The experimental material was derived from 33 trees (girth range of between 120cm and 170cm) originating from 11 Douglas-fir stands (age range of between 41 and 69 y.o.) representative of contrasting sylvicultural management practices: RW_{tree} ranged from 3 to 6 mm. From a bolt located 6 to 8.2m height in the standing trees, boards (38X100X2100mm³) were sawn and graded according to the Belgian Standard NBN B 16-520.

This research evidenced that:

- Only the Knot Area Ratio (KAR) impedes boards to be employed in structural uses. Practically, no board having a KAR allowing S10 grading (S10 corresponds to C30 as defined in EN338) exhibits a ring width higher than 6mm, which is the maximum value accepted for S10 grading (according to NBN B 16-520). These observations demonstrate the highly prevailing character of the knottiness regarding the boards' grading;
- 87% of the boards produced by trees from $RW_{tree} \geq 5$mm can be used in structural uses, but only 7% can be classified into S10 strength class. In comparison, trees with $RW_{tree} < 4.5$mm also provided 87% of boards which can be used in structure, but 18% of the boards can be graded into S10 strength class;
- 89% of the boards produced by stands with MGI>3cm/year are accepted for structural uses, but only 9% are graded into S10 class. Regarding the stands with MGI≤3cm/year, these values are 89% and 24%, respectively.

Growth rate thus doesn't seem to affect the percentage of Douglas-fir boards fit for structural uses. Dynamic sylviculture however significantly decreases the percentage of boards graded into S10 strength class: although it should be supported by financial assessments, early pruning thus seems highly advisable in a context of dynamic sylviculture.

Keywords : Douglas-fir – growth rate – sylviculture – visual strength grading – NBN B 16-520 – structural uses.