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| **Objective branch characterisation of forestry trials using PLS - the tool we’ve been waiting for?** |
| The characterisation of tree branch structure has undergone significant advancements since the introduction of digital methodologies and commercial terrestrial laser scanners (TLS) over the last two decades. The use of point clouds to study tree structure has matured to the point where multiple open-source and ready-to-use software tools are available for this purpose.  Point cloud-based branch characterisation has potential for enhancing tree breeding programmes, expediting the selection of superior genetics for forestry growing stock. Branching is a key trait that impacts on timber quality, however, current methods for assessing branching structure are often subjective and observational owing to the time-consuming and costly nature of objective alternatives. Advancements in remote sensing, particularly TLS, have facilitated objective assessment of branch structure, however, TLS often involves the use of expensive and heavy equipment which can be time consuming and prone to occlusion issues. In contrast, personal mobile laser scanning (PLS) is emerging as a system that offers a more cost-effective alternative that could reduce the impacts of occlusion through its enhanced mobility. The trade-off, however, is that PLS produces noisier point clouds due to lower-quality lasers that are incorporated within them.  This presentation will discuss recent trials utilising PLS for breeding selection, comparing its efficacy with manual measurements of branch structure (including branch diameter, branch angle, branch pattern and branch length), which were captured alongside scans from a PLS. Key metrics were derived from PLS point clouds and then compared with manual measurements to assess their accuracy. Data for the study was captured from two breeding trials of Pinus radiata: one at selection age (age 8), in which trees were access pruned to 2 m, and another at a younger age (age 5), which was unpruned. Sites were selected to evaluate the impact of tree maturity and access pruning on the PLS branch characterisation approach. The findings of this research offer valuable insights into the potential of PLS as a complementary tool for breeding selection programmes. |