

Detection of seedling stand management need using high-resolution remote sensing data

Lauri Korhonen⁽¹⁾, Inka Pippuri⁽¹⁾, Petteri Packalén⁽¹⁾, Matti Maltamo⁽¹⁾ & Juho Heikkilä⁽²⁾

*⁽¹⁾ University of Eastern Finland, School of Forest Sciences
Yliopistokatu 7, 80101 Joensuu, Finland*

*⁽²⁾ Forestry Development Center Tapio
Soidinkuja 4, 00700 Helsinki, Finland*

Email: lauri.korhonen@uef.fi

The use of airborne laser scanning and digital aerial images together with field sample plots provides precision that is sufficient for giving management recommendations in forests that have bypassed the seedling stage. However, in Finland, the guidelines used in the determination of the seedling stand management need are based on stem density, which can not be estimated well enough with current remote sensing techniques. Thus, an experiment was made to directly classify seedling stands into management urgency categories, which were determined by a professional forester for 206 seedling plots in Central Finland. Logistic regression analysis was used model if the stand had need for management, and the standard laser-based canopy height, density and intensity metrics were used as predictors together with texture variables and vegetation indices derived from 25-cm resolution aerial images. The leave-one-out classification of these two classes resulted in 82% classified correctly ($\kappa = 0.64$). The result indicates that the most obvious cases could be detected fairly well, but a large percentage must be checked in the field if a reliable recommendation is required. The prediction of dominant stem density with linear regression yielded 56% relative RMSE.