ABSTRACT

The master thesis deals with determination of selected biochemicals (lignin, carotenoids, water) content in Norway spruce needles using laboratory and imaging spectroscopy. The first part of thesis summarizes literature dealing with methods of estimating lignin and other biochemicals content. Three types of data are used in this thesis: 1. spectra measured by contact probe and ASD FieldSpec 4 Wide Res spectroradiometer, 2. spectra measured by integrating sphere and spectroradiometer and 3. aerial hyperspectral image data acquired by APEX sensor. The most useful transformation methods - first derivative and continuum removal are applied to the spectrum. Further the linear relationship between measured spectrum and content of biochemicals is analysed. Stepwise multiple linear regression is applied to select suitable wavelengths for modeling of biochemicals content in spruce needles. The model is also calculated and applied on the level of image hyperspectral data. Maps of lignin content in Norway spruce are the final output of these part of this. Next part of the thesis compares spectra measured by contact probe and spectra measured by integrating sphere. Diffrerence between the studied areas based on biochemicals content in spruce needles and several chemical elements in the soil and based on measured spectra is also evaluated. Influence of several factors and chemical elements in the soil on biochemicals content in Norway spruce needles is also examined.

Keywords:

Laboratory spectroscopy, image spectroscopy, APEX, Norway spruce (Picea Abies), lignin, carotenoids, water, stepwise multiple linear regression