

## **VARIATION IN LEAF SPECTRAL SIGNATURES: COMPARISON OF FOUR GENERA OF MIXED FOREST TREES**

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Understanding spectral properties of plant leaves is useful in detection of seasonal variation of species (a) within a genera, and (b) among genera between families. This study compares spectral reflectance of leaf samples of 20 trees comprising of four genera, namely *Acer* spp. (six Aceraceae species), *Pinus* spp. (six Pinaceae species), *Fraxinus* spp. (four Oleaceae species), and *Populus* spp. (four Salicaceae species) that was obtained from Lincoln Oakes Nursery in Bismarck in North Dakota. A total of 432 reflectance spectra (at wavelengths between 350 nm and 2500 nm) of 14 broad-leaf and 6 needle-leaf species were acquired using an ASD FieldSpec 4 Hi-Res Spectroradiometer. A mean spectral reflectance for each species was calculated using ASD ViewSpecPro software. Two classification algorithms namely, principal component analysis (PCA) and cluster analysis (CA), were performed using the Primer 5 statistical package to detect the spectral similarity among species. A pairwise comparison of reflectance spectra within a genus was calculated at a threshold value of 0.05. The results showed that the leaf spectra for needle leaf species were clearly distinguishable from broad leaf species from both PCA and CA. In addition, spectral variability among needle leaf species was comparatively lower than for broad leaf species. Of the broad leaf species, *Populus* spp. and *Fraxinus* spp. showed high spectral similarities resulting in distinguishable clusters. In contrast, *Acer* spp. showed a high spectral variability among species ranging from 9 % to 75 %. In conclusion, spectral reflectance data could potentially be used to discriminate seasonal variation among species using high spatial resolution data.