

Eignung der Nahinfrarotspektroskopie (NIRS) zur Vorhersage von aus Vegetationsaufnahmen abgeleiteten kompositorischen Merkmalen

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vorgelegt

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Abstract

The botanical composition of vegetation is determined either by hand separation, which is time-consuming, or by visual estimation, which is less precise. Near infrared-reflectance spectroscopy (NIRS) offers the possibility of a fast, accurate prediction of botanical components in biomass mixtures. In this study, the applicability of NIRS for prediction of compositional features derived from phytosociological relevés was tested. Therefore, contributions and NIRS spectra of four different studies were used to create global MLR- and PLSR- and local PLSR-calibrations for the six groups of Juncaceae, Cyperaceae, Poaceae, Fabaceae, groves and herbaceous species (other), using 198 samples.

With the global MLR-calibrations, an r^2 of 0.54 - 0.86 around a mean of 0.72 and a mean SEE of 10 were reached. Using the PLSR-method, an r^2 of 0.88 – 1 with a mean of 0.94 and mean values of 4.77 for SEE and of 8.62 for RMSECV could be achieved. The results were further optimised by establishing local calibrations with an average r^2 of 0.82, a SEE of 3.75 and a RMSEVC of 5.95 containing many precise but also several weak calibrations. According to the RMSEP of the validations, the best predictions were accomplished using local PLSR-calibrations, whereby a mean of 7.64 was reached. For the global calibrations, 12.1 were reached using the MLR- and 11.85 using the PLSR-method. The study shows that it might be possible to use NIRS for predicting compositional features derived from phytosociological relevés, but that further research using optimal sample distribution is necessary to acquire robust and accurate calibrations.