Titulo: NIRS A POTENTIAL TOOL FOR MONITORING HARVESTING AND TRADE OF SIMILAR WOODS. A CASE STUDY FOR DISCRIMINATION OF MAHOGANY, CEDAR, AND CRABWOOD.

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Resumen: Mahogany is one of the most valuable woods and was widely used until 2003, when it was included in Appendix II of CITES endangered species. As a consequence, in Brazil, sometimes mahogany is traded under different names or some similar woods belonging to the Meliaceae family which are traded as "mahogany"or as being of a "mahogany pattern". In order to investigate the feasibility of a tool for wood instrumental identification, the mahogany (Swietenia macrophylla King.), crabwood or andiroba (Carapa guianensis Aubl.), and cedar (Cedrela odorata L.) woods, in mill form were submitted to Near Infrared Spectroscopy (NIRS) and chemometric analyses by partial least squares discriminant analysis (PLS-DA). The discrimination model was developed based on 81 calibration samples (24, 21 and 36 for mahogany, cedar and andiroba, respectively) and 28 validation samples (9, 7 and 12 for mahogany, cedar and andiroba, respectively). Optimization of the most appropriate wavelength regions and preprocessing methods was performed using the OPUS® software package followed by posterior statistical analysis using Matlab®. The discriminations were performed with a single PLS-DA model with three dependent variables (y), each one corresponding to the discrimination of a wood class (where the value of y was set as 1) from the others (y=0). The observed root mean square errors of predictions (RMSEP), estimated with the validation samples, were 0.12, 0.11 and 0.10 for discriminations of mahogany, cedar and andiroba, respectively, and the separations of the classes obtained with a difference in the predicted values of at least 0.45. Therefore, a large separation between the classes was obtained compared with the error of the model, showing that the application of NIR and PLS-DA is able to perform a safe discrimination of these three woods. The results showed that with this degree of separation and low prediction errors the probability of misclassify a sample is very low. The results also demonstrate the importance of research in this area. The contributions to the development of new methodologies for qualitative and quantitative analysis lead to better accuracy, faster and non-destructive methods. Equipping those involved in forest management will lead to improvements in traffic control and trading activities using a non-subjective discrimination tool.

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