

SPECIES IDENTIFICATION AND SEPARATION BASED ON CHEMOTYPES USING DART-TOFMS

Victor Deklerck¹, Hans Beeckman², Maaïke De Ridder², Pamela J. McClure³, Nils Bourland², Jan Van den Bulcke¹, Joris Van Acker¹, Edgard O. Espinoza³

¹UGCT – Ghent University, Department of Forest and Water Management, Laboratory of Wood Technology, Ghent, BE, victor.deklerck@ugent.be

²Royal Museum for Central Africa, Laboratory for Wood Biology, Tervuren, BE

³National Fish and Wildlife Forensic Laboratory, Ashland, US

Species identification of traded timber is one of the main challenges faced in combating illegal logging. Correct identification of CITES species is key to enforce legal timber trade and to encourage sustainable forestry. A number of techniques are therefore being used by customs for wood identification. For example, wood anatomy and DNA-analyses are but two of commonly employed methods.



Wood anatomy is, however, often insufficient to distinguish on the species level. DNA-analyses are not straightforward to perform, a.o. because of degraded or ancient DNA. However, metabolites are largely under genetic control, hence analysing metabolites may provide a cheap and easy way to identify species. More specifically, Direct Analysis in Real Time (DART) Time-Of-Flight Mass Spectrometer (TOFMS) uses metabolites for wood identification and chemotyping of timber species. This technique can assist in identifying and separating the African timber species *Pericopsis elata* (Harms) Meeuwen from its timber lookalikes.

In DART-TOFMS analysis, heartwood slivers are positioned in a stream of heated helium gas produced by the ion source, resulting in the emission of compounds (ions) from the wood. This allows chemical fingerprinting based on metabolites of the species. A species-distinction can be made based on the intensity of different ions using Kernel Discriminant Analysis or decision trees (Random Forest algorithm). We show that species within one genus from different continents can share a very similar chemical fingerprint but are still distinguishable based on small variations in ion-intensity. DART-TOFMS can be used to identify and distinguish several look-a-like species, thus helping to safeguard the biodiversity in tropical ecosystems by assisting customs to identify illegal logged species.