**A visual wood anatomical key and DART-TOFMS for quick and reliable identification of *Afzelia* species**

P. Kitin1, E. Espinoza2, H. Beeckman3, B.K. Kirchoff4 and P. McClure2

*1 Department of Bacteriology, University of Wisconsin - Madison, USA*

*2 U.S. Fish & Wildlife Service, National Forensics Laboratory, USA*

*3 Laboratory for Wood Biology,* *Royal Museum for Central Africa, Belgium*

*4 Department of Biology, University of North Carolina at Greensboro, USA*

**Corresponding author:** [kitin@wisc.edu](mailto:a.jansen@abc.be)

**Keywords:** endangered species, DART-TOFMS, tropical rainforest, visual key, wood identification

Traditional wood identification relies on diagnostic xylem features visualized by conventional light-microscopy, and recorded in standard wood terminology. This method is well established, based on many years of research and the existence of reference wood collections and wood anatomical information on numerous taxa. However, the precision of identification is usually limited to genus level, which is insufficient for enforcement of the conservation laws for protection of endangered species. Moreover, the method requires extensive expertise in specimen preparation, microscopy, and wood anatomical terminology. Identification of wood is typically made using dichotomous keys or computer software with the input of text-based wood characters. In contrast, we developed visual identification keys that substitute micrographs for text-based characters, and use direct comparisons of images of unknown wood to reference images from known species. The digital images contain more information for taxa identification than can be captured by terminology, which speeds up the process of identification. This information can be revealed either by image analysis, or directly by visual comparison of the microphotographs. Our further step, in order to answer questions on wood identification at the species level, was to use wood fluorescence and DART-TOFMS (Direct Analysis in Real Time-Time of Flight Mass Spectrometry). These two methods were compared and verified on 187 samples of five species of *Afzelia* (Fabaceae) from the Tervuren wood collection. Our integrative protocol based on a visual identification of wood structure and chemical signatures by DART-TOFMS provided accurate and quick identification of *Afzelia* species.