**Tropical wood species identification: anatomical description, pattern recognition or visual key? A comparison of methods**

M. Rousseau1, M. De Ridder1, N. Rosa da Silva2, H. Beeckman1

*1 Wood Biology Service, Royal Museum for Central Africa, Belgium*

*2 Institute of Mathematics and Computer Science, University of São Paulo (USP), Brazil*

**Corresponding author:** [melissa.rousseau@africamuseum.be](mailto:melissa.rousseau@africamuseum.be)

**Keywords:** anatomical description, pattern recognition, visual key, wood identification

Wood identification is crucial for conservation and enforcement mechanisms like FLEGT, Lacey Act, CITES and for timber certification systems. To develop guidelines on how to identify timber species during international trade, it is interesting to study benefits and disadvantages of the available methods of wood identification. Our aim is to compare three different techniques to identify wood: (i) full wood anatomical descriptions, (ii) pattern recognition and (iii) visual identification keys. The traditional work on wood identification by means of anatomical descriptions describes the wood anatomical features (cells and tissues) of thin section of the three planes. A least two qualified wood anatomists are needed to validate a description, making the method time-consuming. Pattern recognition is less dependent on expert knowledge of wood anatomy. A recent pattern recognition study based on high-quality microscopic images permitted to identify 77 wood species from the Democratic Republic of Congo with a success rate of 87%, using only the transversal section. The third identification method, the visual key, is a practical way for non-professional wood anatomists (like custom officers) to identify different species. In this case, images of an unknown wood sample are compared with reference images from microscope slides. This type of identification method is promising but not easy to develop, taking into account the need to combine wood anatomists’ knowledge with the input of at least one expert in cognitive psychology. We discuss different characteristics of these three methods and their use on tropical wood species.