CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Twenty-second meeting of the Plants Committee
Tbilisi (Georgia), 19-23 October 2015

Interpretation and implementation of the Convention

Species trade and conservation

Trees

IMPLEMENTATION OF THE CONVENTION FOR *DALBERGIA* SPP.

1. This document has been submitted by the regional Representatives for Europe.*

2. At the IX European Regional CITES Plant Meeting (Wageningen, the Netherlands, 10-14 November 2014) discussions centred on the implementation of the CITES tree listings, including those for *Dalbergia* species. In particular, there were exchanges about the challenges faced by importing countries to implement CITES for the various *Dalbergia* species listed in the CITES Appendices. A key recommendation from the meeting was that there should be further consultation within the European region on the issues related to the implementation of the current *Dalbergia* listings, and share these with range States should they be considering the development of proposals to include additional *Dalbergia* species in the Appendices to the Convention. It was also recommended that this item be included on the agenda of the 22nd CITES Plants Committee (Tbilisi, October 2015) for further discussion. The consultation was carried out by the alternate Representative for Europe (Mr. P. Carmo) with the assistance of Parties in the region. This paper reports the results of this consultation and lists a number of issues identified and actions suggested by Scientific Authorities in the European region. It should, however, be noted that these suggested actions do not represent a list of actions that Parties of the European region intend to take in the short term, nor for which resources have been secured.

3. There are approximately 250 species of trees, shrubs and woody climbers in the genus *Dalbergia* (family: Leguminosae / Fabaceae). The species are widely distributed throughout tropical and sub-tropical regions and can be grouped into three major geographical regions – Central and South America and the Caribbean, Africa and Asia. There are currently 58 species listed on CITES (see Table 1).

4. Replies to the consultation were received from Belgium, Germany, France, Italy, Israel, Latvia, Malta, the Netherlands, Portugal, Romania, Spain, Sweden, Switzerland, Turkey, the United Kingdom of Great Britain and Northern Ireland and the European Commission.

5. The replies to the consultation raised a number of issues that are presented below for discussion.

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* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Table 1 – Current CITES listings for *Dalbergia* species

Species/genus	Appendix I	Appendix II	Appendix III
D. nigra			
D. cochinchinensis		#5	
D. darienensis (population of Panama)			#2
Dalbergia spp. (populations of Madagascar). Currently 48 accepted species (http://www.cites.org/sites/default/files/eng/com/sc/65/Inf/E-SC65-Inf-21.pdf)		#5	
D. granadillo, D. retusa, D stevensonii		#6	
D. calycina, D. cubilquitzensis, D. glomerata (populations of Guatemala); *D. tucurensis* (Nicaragua. In addition Guatemala has listed its national populations)			#6

6. **Taxonomy**

A global monograph of the genus *Dalbergia* has yet to be completed and therefore some taxonomic uncertainties exist within the genus. Certain geographic areas or specific species have been covered in some depth (e.g. Madagascar) and new regional taxonomic works are underway (e.g. Asia). Taxonomic reference(s) for the genus include the following:

- Bosser, J. and Rabevohitra, R. (2005). Espèces nouvelles dans le genre *Dalbergia* (Fabaceae, Papilionoideae) à Madagascar. Adansonia, sér. 3, 27(2): 209–216;

- Carvalho, A. (1997). A synopsis of the genus *Dalbergia* (Fabaceae: Dalbergieae) in Brazil. Brittonia Volume 49, Issue 1, pp 87-109;

- Du Puy, D. J., *et al*. (2002). Legum. Madagascar 737 pp. Royal Botanic Gardens, Kew, London;

- Thothathri, K. (1987). Taxonomic Revision of the Tribe Dalbergieae in the Indian subcontinent. Botanical Survey, India, Calcutta;

- Vatanparast *et al.* (2013). South African Journal of Botany 89: 143-- 149 - A preliminary molecular phylogeny of the genus; and

- The list of *Dalbergia* species found in the Catalogue of Madagascan Vascular Plants (http://www.tropicos.org/Project/MADA) is the most up-to-date and comprehensive taxonomic reference for the Madagascan species.

Suggested actions

- Continue to compile information on possible unnamed *Dalbergia* species both in the field and in herbaria; and

- Continue to collect data on *Dalbergia* species in order to assess their conservation status/level of threat.

7. **Trade names**

It was recognised that enforcement and tracking/reporting of *Dalbergia* species in trade is hampered by the use of common trade names, such as “rosewood” as it can relate to CITES-listed *Dalbergia* species and to many non-listed *Dalbergia* species or species from different CITES or non- listed genera. A clear indication from the trader or exporter/importer of the scientific name associated with a shipment would assist enforcement officers, CITES Scientific Authorities or wood identification experts dealing with such cases.

Suggested actions

Compile and circulate information (or improve access to existing sources of information) on common trade names for *Dalbergia* species, in particular those using the name "rosewood" when in trade. A number of capacity building tools containing such lists are available e.g. “CITES Identification Guide - Tropical Woods” (https://cites.unia.es/cites/file.php/1/files/CAN-CITES_Wood_Guide.pdf) and "CITES and Timber - A Guide to CITES-listed Tree Species" (http://www.kew.org/data/CITES_User_Guides/CITES-and-Timber.pdf).

8. **Identification**

Species identification is seen as key to the implementation of many timber species listings, in particular to aid the making of non-detriment findings (NDFs) and the accurate reporting of CITES specimens in trade. In that context, work on improving the identification of *Dalbergia* species is underway. The Parties of the European region recognised that the following identification issues are relevant to *Dalbergia* species listings:

- The need for more voucher samples to facilitate the development of identification tests;

- The need for coordination between the various institutes/experts collecting wood samples and developing tests in order to eliminate replication of work and to ensure test costs and timelines are kept to an acceptable level for enforcement;

- The lack of expert wood identification experts/forensic laboratories in-country;

- The lack of enforcement staff trained on timber issues and listings/identification; and

- The need to identify look-a-like species or improve testing to differentiate between listed and non-listed *Dalbergia* species and look-a-like species. For example, the genera *Pterocarpus* and *Machaerium* are closely related to *Dalbergia* while other lookalike genera include *Dicorynia, Caesalpinia,* and *Swartzia*. It was acknowledged that samples could be taken from seized timber material and although they would not have guaranteed provenance they may prove useful in the development of identification tests.

Current or previous projects/work carried out on the identification of *Dalbergia* species is found in Annex 1.

Suggested actions

- Assign a central point of contact for the compilation and dissemination of information on timber identification tests. This contact could also be used to inform the Parties of the current identification and sample collecting projects being carried out, available forensic tests, capacity building tools on wood identification and contact information on in-country/regional wood identification experts;

- Continue to develop and carry out capacity building for policy and enforcement officers and compile a comprehensive list of species / genera that are considered look-a-like for *Dalbergia*;

- Distribute a new version of the database CITES*wood*ID which includes all CITES listed *Dalbergia* species, thereby classifying the Madagascan species in to two distinguishable groups; and

- Build up identification capacities (e.g. establishment of an wood anatomical laboratory/creation of a xylotheque) at the University of Antanarivo (Madagascar), based on research carried out by Malagasy scientists at ETH Zurich in 2014.

9. **Non-detriment findings (NDFs)**

The consultation highlighted the fact that the making of an NDF should be made at the species level, therefore the correct identification of specimens in trade and the availability and use of scientific names (not just trade names) are key to the making of NDFs and the implementation of the CITES listing as a whole. It was recognised that the making of NDFs are linked to the issues raised in this document under taxonomy, identification, use of trade names, use of more detailed tariff codes to track the timber trade and the need to engage with the timber trade on the accurate use and application of scientific names.

Suggested actions

- Ensure NDFs are made at the species level; and

- Encourage further outreach with the timber trade on the accurate use of scientific names and promote use of existing capacity building tools to aid them in this process (e.g. Species + http://www.speciesplus.net/).

10. **Annotations**

The consultation highlighted the need for Parties to continue to support the work of the Standing Committee's Annotation Working Group (SC WG) in collaboration with the Plants and Animals Committees. The identification of the key timber products in trade and those that are primarily exported by producer countries so that the appropriate annotation is assigned to a listing (Decision 15.35 - Annotations for tree species included in Appendices II and III http://cites.org/eng/dec/valid16/15_35.php), is crucial to any listing. It was also noted that some of the current *Dalbergia* listings may be encountering problems with the use of the #5 and # 6 annotations (e.g. *D.cochinchinensis*). For example, listings may be circumvented by minimal working of the wood prior to export and more inclusive or appropriate annotations (e.g. #4) may be required. In other cases, the annotation does not cover those parts of the product that first enter or dominate the international market.

The consultation identified that a number of *Dalbergia* species are cultivated in plantations or other agro-forestry systems (e.g. *D.sissoo* – Indian rosewood) within and outside of their country of origin. It was recognised that future listings of *Dalbergia* species should take into consideration whether these systems exist for the species in question, whether they fulfil the current definition of artificial propagation for tree species (Resolution Conf. 11.11 (Rev. CoP15) and Resolution Conf. 10.13 (Rev. CoP15)), that the source of timber products on a permit is correctly given, and that the appropriate annotation covers the products primarily exported by producer countries or that dominate the trade. It was also recognised that listings that are limited to specific geographic regions, as illustrated with the listing of *Swietenia macrophylla* ("Neotropics only"), would be assisted by a broad knowledge of the regional/international trade in that taxa for the listing implementation to work and to ensure the correct annotation (if required) is used.

Lessons on the use of annotations for a new listing proposals for *Dalbergia* at the genus/species level can be learnt from the current *Dalbergia* listings and the following suggested actions were identified as useful to inform this work:

Suggested actions

- For higher taxonomic listings, a preliminary trade study to assess the production of *Dalbergia* species worldwide could inform such a listing proposal and annotation (if required). The identification of key production sites for artificially propagated material would prove useful to inform the scope of the listing;

- Ensure the annotation to any listing is simple, enforceable and easily understood by the non-expert; and

- Ensure any annotation contributes to a non-detrimental trade in the respective species and guarantees that commodities that first appear in international trade as exports from range States and that dominate the trade and the demand for the wild resource are sufficiently covered.

11. **Enforcement**

Globally, the critical issues for law enforcement are access to capacity building tools that help identify the legality and sustainability of the timber product for on-ground enforcement personnel, easily interpreted listings and annotations and how to access robust forensic identification services to support a legal case. Scientific methods to do this reliably are often lacking, due mainly to lack of resources, lack of access to appropriately validated reference material, and lack of taxonomic clarity. These intertwined issues can only be addressed through improved support for collection and study of the species in question.

A project was recently announced under the "Programme for Implementing CITES Listings of Tropical Tree Species", jointly implemented by the International Tropical Timber Organization (ITTO) and the CITES Secretariat, and concerns the establishment of a fully documented reference sample collection and identification system for all CITES-listed *Dalbergia* species and a feasibility study for *Diospyros* and look-alike species.

The following issues relevant to the enforcement of *Dalbergia*, and often other timber listings, were identified from the consultation as requiring further examination and discussion:

Suggested actions

- Harmonised System (HS) tariff codes - in general these may not sufficiently differentiate between genera/species/products to allow a complete tracking of *Dalbergia* spp. in trade. This can make any analysis of the trade to support a listing difficult to carry out and therefore to determine which products should be regulated and which annotation to apply to the listing. Individual Parties could include explanation notes to the tariff codes that specify the species included or excluded. The latter is being investigated by Spain's CITES authorities and customs agencies and China is using a specific HS code to identify common "hongmu" species in trade (see http://www.forest-trends.org/documents/files/doc_4368.pdf).

- Trade patterns - an analysis of the trade patterns and routes of the taxa in question can inform a CITES listing and listing proposals as it allows Parties to focus on key areas of import/re-export, identify products in trade and train appropriate enforcement staff.

- Identification training - as the identification to species level is not comprehensive for the genus *Dalbergia* or always sufficiently robust for enforcement staff to present in court, enforcement can be limited. Some help comes from macroscopic tools like CITES*wood*ID, which is constantly kept up-to-date and will include in its next version all *Dalbergia* species covered in the Appendices I, II and III. However, even basic training is required in many Parties within the European region and a comprehensive programme of training may be required. In that regard, in 2013 the European Commission asked TRAFFIC to collect available information on institutions with morphological or molecular timber identification expertise, details of experts in timber identification and tools/manuals available to help authorities with identification, mainly in Europe (Phase 1). It is intended that this information be brought together in the form of a directory, with the aim of providing this to all CITES Parties in the future (Phase 2). As a follow-up to discussions held during the 21st meeting of the Plants Committee (Veracruz, 2014) regarding the development of a timber identification directory for CITES-listed species (PC21 Doc. 15), TRAFFIC has continued working with various partners, including the Global Timber Tracking Network (GTTN), with a view to exploring possibilities to develop a database informing enforcement and policy staff of existing identification tests and institutes.

- Stockpiles - as a number of Parties do not track existing stockpiles of *Dalbergia* species within their countries it may be difficult to differentiate at a later date between pre-Convention and newly imported material - a case that already exists with *D.nigra* within the European Union (see http://ec.europa.eu/environment/cites/pdf/Dalbergia%20Report_FIN%2020%2012%202012.pdf and www.traffic.org/forestry-reports/traffic_pub_forestry9.pdf).

12. **Conclusion**

Taking into consideration the above discussions arising from the consultation within the European region and to inform future discussions regarding current and new proposals to list *Dalbergia* at the species/genus level, the Plants Committee is invited to:

- Take note of the issues raised in this document;

- Share the experiences with those from other regions; and

- Consider further steps to support the implementation of current *Dalbergia* listings and future listing proposals.

Identification projects

Chemical and genetic:

- Scientists at the Royal Botanic Gardens, Kew (RBG, Kew) have developed a set of chemical markers that can identify *D. nigra* from other *Dalbergia* species. Chemical analyses showed that one of the main phenolic compounds extracted from wood of *D. nigra* was not present in any of the other species having similar wood anatomy. The compound was isolated and it was discovered that it was a compound new to science and it was named dalnigrin. See http://www.kew.org/discover/news/chemistry-aids-conservation (Kite, G.C., *et al.* (2010). Dalnigrin, a neoflavonoid marker for the identification of Brazilian rosewood (*Dalbergia nigra*) in CITES enforcement. *Phytochemistry* 71: 1122-1131. doi:10.1016/j.phytochem.2010.04.011). Contact - Geoff Kite (g.kite@kew.org) and Pete Gasson (p.gasson@kew.org).

  RBG, Kew and FERA have also completed a project to explore the use of stable isotopes to identify the country of origin of timber from Madagascar. The data generated by this pilot study indicate that there is potential for using SITE analysis for regulating the legal trade of timbers. Both stable isotopes and trace elements showed geographical differentiation at the country level and could be used in combination with visual identifications based on wood structure and DNA analysis. Contact - Stuart Cable (s.cable@kew.org).

- The Fish and Wildlife Service Forensic Laboratory (Oregon, USA) has developed mass spectrometer databases for the identification of *Dalbergia* species (rosewoods) and look-alikes from South America, Central America, S.E. Asia, Africa and Madagascar using Direct Analysis in Real Time (DART) Time-Of-Flight Mass Spectrometry (TOFMS). *Dalbergia cochinchinensis* and *Dalbergia* species from Madagascar (both CITES Appendix II) were differentiated from each other and from the non-protected *D. latifolia* and *D. melanoxylon*. In their latest paper *D. retusa* and *D. granadillo* were compared using traditional anatomical methods. DART TOFMS spectra were collected from the heartwood of eight species of *Dalbergia* and six other look-alike species. In all, fourteen species comprising of 318 specimens were analyzed and the species chemical profiles were examined by statistical analysis. *D. nigra* (CITES Appendix I) was differentiated from *D. spruceana*; *D. stevensonii* (Appendix II) was distinguished from *D. tucurensis* (Appendix III) and all the look-alike timbers could be readily distinguished. However, *D. retusa* (Appendix II) could not be differentiated from *D. granadillo* and they postulate that they are synonymous. DART TOFMS spectra are useful in making species identifications of American *Dalbergia* species, and could be a valuable tool for the traditional wood anatomist. See the following papers for more information:

  - Lancaster, C., and Espinosa E. (2012). Analysis of select *Dalbergia* and trade timber using direct analysis in real time and time-of-flight mass spectrometry for CITES enforcement. Rapid Commun. Mass Spectrom. 2012, 26, 1147–1156 (wileyonlinelibrary.com) DOI: 10.1002/rcm.6215. http://onlinelibrary.wiley.com/doi/10.1002/rcm.6215/abstract

  - Dormontt, E.E., *et al*. (2015). Forensic timber identification: It's time to integrate disciplines to combat illegal logging, Biological Conservation http://dx.doi.org/10.1016/j.biocon.2015.06.038.

  - Espinosa, E., *et al*. (2015). Forensic analysis of CITES-protected *Dalbergia* timber from the Americas. IAWA Journal 36 (3): 311–325.

  - McClure, P.J., G.Chavarria, and Espinoza E. (2015). Metabolic chemotypes of CITES protected *Dalbergia* timbers from Africa, Madagascar, and Asia. Rapid Commun. Mass Spectrom. 29, 783–788 (wileyonlinelibrary.com) DOI: 10.1002/rcm.7163. http://199.171.202.195/doi/10.1002/rcm.7163/abstract

  - Musah, R. A. *et al.* (2015). A High Throughput Ambient Mass Spectrometric Approach to Species Identification and Classification from Chemical Fingerprint Signatures. *Sci. Rep.* 5, 11520; DOI: 10.1038/srep11520

  Contact - USFWS Forensic Laboratory - Gabriella Chavarria (gabriela_chavarria@fws.gov) and Ed Espinosa (ed_espinoza@fws.gov).

- The DNA-based identification of rosewood species from Madagascar is being carried out by Sonja Hassold at the ETH Zurich (Swiss Federal Institute of Technology), Switzerland. The goals of the project are to develop and validate molecular ID tools for Madagascan *Dalbergia* species using DNA barcoding and to help incorporate this technique into international trade regulation and law enforcement. Sample identification is a key problem due to the difficulty in acquiring well identified reference material and further sample collection is required. Current molecular data are adequate for tracing rosewood samples to Madagascar but cannot yet distinguish among all species. SSRs (microsatellites, or simple sequence repeats) can be used to identify individual logs. More extensive sampling and SNP-based markers are required to distinguish between a larger number of species and potentially assign logs to areas of origin. Results from different methods could be combined to increase resolution. See http://www.ethlife.ethz.ch/archive_articles/111014_raubbauholz_strichcodes_per/index_EN and http://www.jmest.org/wp-content/uploads/JMESTN42350358.pdf

  Contact - Sonja Hassold (sonja.hassold@env.ethz.ch)

- The French development agency, CIRAD, has undertaken a project to examine fragmentation on the genetic diversity of one species of Madagascan *Dalbergia* (*D.monticola* - http://publications.cirad.fr/une_notice.php?dk=552505).

Anatomical features:

- The CITES*wood*ID database uses macroscopic features to determine species/genera in trade (**CITES*wood*ID**. This database provides computer-aided Identification and description of CITES protected trade timbers and enables the user to identify by means of macroscopic characters. Contact - Hajo Schmitz-Kretschmer (Hajo.Schmitz-Kretschmer@bfn.de).

- InsideWood, a web resource for wood anatomy, containing anatomical descriptions and/or photographs of 53 out of the 250 species of *Dalbergia*, 19 of the 35 species of *Pterocarpus* and 23 of the 130 *Machaerium* species (see http://insidewood.lib.ncsu.edu/welcome;jsessionid=232E954555A52CAF1E94203F6C9BA16D). The InsideWood database has 8,735 descriptions and 45,225 images, 6,928 modern wood descriptions and 42,315 modern wood images,1,807 fossil wood descriptions and 2,910 fossil wood images. Contact - insidewood@lists.ncsu.edu

- The International Association of Wood Anatomists (IAWA - see http://www.iawa-website.org/index.html) publishes work on wood anatomy in collaboration with a number of partners including RBG, Kew. The following paper has anatomical descriptions and photographs of *D. nigra, D. retusa* and *D. stevensonii*:

  - Gasson, P., Baas, P., and Wheeler, E. (2011). Wood anatomy of CITES-listed tree species. *IAWA Journal* 32(2): 155-197.

  The following two papers also address the identification issues for *Dalbergia* and *Pterocarpus*:

  - Gasson, P., Miller, R., Stekel, D., Whinder, F., and Zieminska, K. (2010). Wood identification of *Dalbergia nigra* (CITES Appendix I) using quantitative wood anatomy, Principal Components Analysis and Naïve Bayes Classification. *Annals of Botany* 105: 45-56. DOI:10.1093/aob/mcp270 at http://aob.oxfordjournals.org/content/105/1/45.short

  - MacLachlan, I, and Gasson, P. (2010). Quantitative wood anatomy using multivariate principal components analysis for identification of the CITES listed *Pterocarpus santalinus* (Dalbergioideae, Papilionoideae, Leguminosae). *IAWA Journal* 31(2): 121-138.

  Contact - Federic Lens (frederic.lens@naturalis.nl) and Pete Gasson (p.gasson@kew.org)

- George Schatz and Peter Lowry (Missouri Botanic Garden http://www.missouribotanicalgarden.org/), with support from the National Geographic Society, have been collecting voucher wood samples with leaf and DNA samples of *Dalbergia* (and *Diospyros*) species from northeast Madagascar, an area that have been most affected by the illegal logging. Contact - Pete Lowry (Pete.Lowry@mobot.org).

- The Madagascan CITES authorities have been involved with the collection of wood and herbarium specimens for identification purposes within an ITTO-CITES project but further samples from all regions, particularly those not included in this project, are required. Contact - Docteur Ramarosandratana Aro Vonjy (arovonjy@yahoo.fr)

- A project on the anatomical identification of Madagascar precious woods (Harisoa Ravaomanalina - Madagascan CITES authorities - Alan Crivellaro and Fritz Schweingruber) is underway to prepare an atlas of bark and wood structure of the rosewoods and ebonies from Madagascar (Swiss Federal Institute for Forest, Snow and Landscape Research - WSL). Nineteen species of *Dalbergia* (and 44 species of *Diospyros*) have been collected (twig, leaves and wood) with the collection of more voucher samples required to ensure the coverage is comprehensive (Harisoa B. Ravaomanalina, Alan Crivellaro, Fritz H. Schweingruber (2015). Stem Anatomy of *Dalbergia* and *Diospyros* from Madagascar With Special Focus on Wood Identification). Contact - Harisoa.Ravaomanalina (harisoa.ravaomanalina@gmaol.com or harisoa.ravaomanalina1@gmail.com)