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OF WILD FAUNA AND FLORA

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UNDOCUMENTED TRADE IN SPECIES OF ORCHIDACEAE

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Undocumented trade in species of Orchidaceae: examples from Asia, the eastern Mediterranean region and Africa

All species in the family Orchidaceae (orchids) are covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Orchidaceae represent the large majority of species appearing CITES Appendices I and II. There are six individual orchid species (*Aerangis ellisii, Dendrobium cruentum, Laelia jongheana,Laelia lobatea Peristeria elata,Renanthera imschootiana*) and two orchid generic groupings [*Paphiopedilum* (88 species) and *Phragmipedium* (25 species)] listed on Appendix 1. For these Appendix 1 listings, exemptions exist for seedling or tissue cultures obtained *in vitro*, in solid or liquid media, and transported in sterile containers and which meet the definition 'artificially propagated'; these are not subject to the provisions of the Convention agreed by the Conference of the Parties.

All of the remaining ~27,600 recognized orchid species (http://www.emonocot.org/) appear on Appendix II, with exemption or annotation (#4) from the CITES provisions for: seeds (including seedpods of Orchidaceae), spores and pollen (including pollinia); seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers; cut flowers of artificially propagated plants; and fruits, and parts and derivatives thereof, of naturalized or artificially propagated plants of the genus *Vanilla* (Orchidaceae). For full details, see https://www.cites.org/eng/app/appendices.php.

At the time of the inclusion of the whole family on CITES, there was a) little information about the level of trade in most orchid species, b) compelling evidence that international trade was a significant element in the decline of any species or c) studies that showed that species were even threatened (Koopowitz, 2001; p. 107). However, despite their inclusion on the CITES Appendices, there is an increasing body of evidence that many species are being traded across international borders in the absence of CITES permits.

International trade in orchids can be loosely divided into two major categories based on the use of the plants a) in horticulture or b) as medicine and/or food. Much of the international trade for horticulture is either covered by the appropriate permits or exempt due to the plants being artificially propagated. However, there are well documented cases of newly described species appearing in countries other than the country of origin, despite permits not having been issued, including *Paphiopedilum vietnamense* (e.g. http://www.orchidsociety.com/?p=236) and *Phragmipedium kovachii* (e.g. http://www.slipperorchids.info/phragdatasheets/kovachii /index.html), both of which appear on Appendix I.

The focus of this document is on the second class of trade in which orchids or products derived from them are traded internationally for medicine and/or food. Such trade takes place in many parts of the world; Bulpitt (2005) and Hossain (2011), for example, listed traditional medicinal uses of orchids in SE Asia, China, Japan, Europe, Africa, America and Australia. Although not all of this trade involves international movement of plants or products (e.g. Acharya & Rokaya, 2010), there is an increasing body of evidence relating to illegal collection and international trade in orchids and their products for food and medicine.

Traditional Medicine

Orchids are used extensively in traditional medicine in various areas of the world and information about some of these is provided here:

Orchids have been long used in Asia in traditional medicine for a range of conditions, despite the lack of proof of efficacy in most cases (Bulpitt, 2005). Much of the demand for orchids is met by collection within a country, and therefore CITES does not relate to this trade. However, there is increasing evidence that some of the orchids and orchid products sold as traditional medicines are transported across international borders and that not all of this trade is compliant with CITES. An internet search with the search words "illegal, medicine, orchids", for example, identifies reports of illegal trade between several countries, excerpts from some of which are provided below.

> "Legal and illegal border trade between Myanmar and China increased after 1988. The Myanmar native orchid is not widely used in traditional medicine here [i.e. Myanmar], but orchids have been widely used in Chinese medicine for centuries." (http://www.mmtimes.com/index.php/national-news/9796-orchid-smuggling-putting-rare-species-at-risk-warn-experts.html)

> "Poaching is putting increasing pressure not just on animals but on plants too. In northern India, illegal harvesting of wild orchids destined for the Chinese herbal medicine trade is decimating local populations." (http://gardendrum.com/2015/04/23/poaching-threatens-rare-indian-orchids/)

> "Sadly, tens of thousands of orchids are harvested from the remaining forest fragments [in Hong Kong] each year to fuel the horticultural and medicinal plants trade." (http://www.scmp.com/news/hong-kong/article/1711266/wild-orchids-spotted-sale-mong-kok-despite-legal-protection)

This illegal trade does not only relate to movements of plants in Asia. Orchids were, for example, listed among the top ten illegal wildlife crime items by HM Customs and Excise in the UK in 2006-2007 (http://www.wwf.org.uk/wwf_articles.cfm?unewsid=1286; see also http://www.traffic.org/eu-wildlife-trade) and Brinkmann (2014) identified 39 orchid species that are to be found in the trade in Europe, many of which are used in traditional medicines.

Some species used in traditional medicines are now being artificially propagated, and it is hoped that this will relieve the pressure on wild populations. For example, the vulnerable *Gastrodia elata* (China Plant Specialist Group, 2004), "tian ma" used for allergies, headache etc. (Bulpitt, 2005), is "increasingly cultivated, especially in China" (http://www.itmonline.org/arts/gastrodia2.htm).

Orchids are also widely used elsewhere in traditional medicine. Chinsamy *et al*. (2011), for example, reported on the use of orchids as medicines in South Africa. Although they did not specifically refer to cross-border trade in orchids, they alternated between using "South Africa" and "southern Africa", implying that some, at least, of the trade is international. They also identified the problem that many medicinal plants and products are sold under local names, with the same name sometimes being used for multiple species (see below in the sections on *salep* and *chikanda*). Mixed collections of different species or genera represent a further problem in monitoring international trade in medicinal orchids.

Salep

In Asia Minor, *salep* refers to the dried tubers of terrestrial orchids, the flour made from them or a drink prepared from the flour. Ice cream is also prepared from the flour. Turkey is the main producer of *salep*, but more recently harvest of tubers in Iran, for example, has been boosted by demand for tubers from Turkey (due to the depletion of wild populations there) and from Pakistan and India. Ghorbani *et al*. (2014) estimated that 7-11 million orchids, representing 19 species and subspecies in seven genera, were harvested in Iran in 2013 for *salep* production, stating that these numbers are unlikely to be comprehensive. Although some of this harvest is destined for in-country use, these authors stated that "as *salep* is not commonly consumed in Iran, the current orchid collection boom … is driven by international demand" and that in the absence of any collection or export permits "the international trade in tubers is clearly illegal". The practice of mixing orchid flour with other types of flour, e.g. from nuts, and exporting it under a permit for the other products has made the trade difficult to police, but DNA barcoding techniques should make this more feasible. Ghorbani *et al*. (2014) concluded by making recommendations for mitigating the effects of illegal collection, including collection bans in heavily exploited areas, enforcement of regulations and development of guidelines for sustainable harvesting.

Chikanda

Less widely known than *salep,* the traditional delicacy *chikanda*, made from ground orchid tubers and peanut flour, has been eaten for many decades in Zambia and neighbouring countries (Davenport & Ndangalasi, 2003; Veldman *et al.,* 2014). Most of the species harvested for *chikanda* production are

members of the genera *Disa, Satyrium* and *Habenaria*, but as identification of tubers is difficult because they are collected when the flowers have already withered, the species involved are not always clear. In Zambia, the depletion of native orchids resulting from collection for *chikanda* has led to the sourcing of orchid tubers from other countries, including Tanzania, Angola, Democratic Republic of Congo and Malawi (Veldman *et al*., 2014). Despite all the species being listed on Appendix II, Davenport & Ndangalasi (2003) estimated that between two and four million orchid tubers were being exported from Tanzania to Zambia per annum and they stated that none of this trade was registered under CITES at the time of their surveys and that they found no evidence for the species involved being cultivated. As a result of collection for *chikanda*, these authors concluded that "many Tanzanian orchids across the south of the country will be seriously threatened by this little known but rapidly escalating international trade". More recently, Veldman *et al*. (2014) obtained similar information relating to this trade. Using state-of-the art DNA sequencing techniques they identified six *Disa* spp., 11 Satyrium spp. and one *Habenaria* sp. in the samples they studied. In conclusion, Veldman *et al.* (2014) identified a need for additional information for Customs officers about CITES regulations and the *chikanda* trade and for an investigation into the possibility of orchid cultivation and trade regulation.

The impact of CITES on orchid research and conservation

An unintended result of the listing of all orchid species on the CITES Appendices has unfortunately been a decrease in the level of international cooperation in research activities in support of orchid conservation (Koopowitz, 2001, pp. 111-112; Roberts & Solow, 2008). This issue is compounded by the fact that some countries that are rich in orchid species but poor in the scientific technology needed for research to underpin their conservation do not have any Registered Scientific Institutes.

Conclusions

Although the listing of all orchid species on CITES was aimed at ensuring that international trade does not threaten their survival in nature, a) numerous recent reports of cases indicate that undocumented and illegal international trade is still having a severe impact on orchid populations around the world and b) the lack of Registered Scientific Institutes in some countries is having the unintended result of a decrease in scientific research underpinning orchid conservation.

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