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

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PRODUCTS CONTAINING SPECIMENS OF APPENDIX-II ORCHIDS

1. This document has been prepared by the Secretariat and is submitted in relation to document PC25 Doc. 37 on *Products containing specimen of Appendix-II orchids*.[1]

2. The Annexes to this information document contain the original research done by Switzerland on which the analysis in PC25 Doc. 27 is based, in the language and format in which they were submitted to the Secretariat.

3. The Annexes contain information that relates to the following orchid species or products:

Annex	Species or product	Summaries previously submitted by Switzerland
1	*Vanda coerula*	PC23 Doc. 32
2	*Vanda tesselata*	PC23 Doc. 32
3	*Papilionanthe teres (Vanda teres)*	PC23 Doc. 32
4	*Cypripedium parviflorum var. pubescens*	PC23 Doc. 32
5	*Cymbidium* spp.	PC24 Doc. 28
6	Salep	PC23 Doc. 32
7	Chikanda	PC23 Doc. 32
8	*Bletilla striata, Bulbophyllum* spp., *Cattleya* spp., *Cycnoches cooperi, Dendrobium* spp., *Orchis* spp., *Paphiopedilum* spp., *Phalaenopsis* spp.	PC24 Doc. 28
9	*Orchis* spp., *Dactylorhiza* spp.	PC24 Doc. 28
10	Flower and vibrational essences	PC23 Doc. 32
11	Fragrances / *Vanda* spp.	PC23 Doc. 32
12	Various – overview document	PC23 Doc. 32

4. No specific document containing research on *Gastrodia elata* was submitted to the Secretariat. However, summary information is contained in document PC23 Doc. 32 and was included in the analysis presented in document PC25 Doc. 27.

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[1] *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.*

Case Study of Vanda coerulea

Commissioned by

Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

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Executive Summary

Vanda coerulea is an epiphytic orchid found in India, Myanmar, Nepal, PR China and Thailand and likely to occur in Bhutan, Lao PDR and Viet Nam. This taxon has not yet been assessed for the IUCN Red List but threats include loss of habitat and collection for local / regional medicinal and horticultural markets. These threats may have contributed to the restriction of the species range, hence the lack of recorded occurrences in certain range States. Due to over-collection this species was listed in Appendix I of CITES in 1979; it was later downlisted to Appendix II in 2005. Up-to-date field studies of this species throughout its range are lacking which leads to an incomplete assessment of its current conservation / population status and creates difficulties in assessing the effects of trade on wild populations. This species is in cultivation worldwide, but it is its hybrids that are preferred in trade and which are in commercial cultivation for the live plant and cut flower industries. This species does not appear to be in general use in modern Ayurvedic medicine in Europe, but it is documented as used in local medicinal treatments in India.

V. coerulea and its hybrids are also traded as extracts that are included as ingredients in finished cosmetic products. Outreach to the cosmetic industry indicates that the trade flow from raw material to finished cosmetic or personal care product can entail unprocessed or processed material (e.g. stems, aerial / flower tips, tissue cultured live plants, dried plants) being sourced from horticultural nurseries in range States (e.g. Thailand and PR China) and non-range States (e.g. France). No nurseries specifically growing orchids for extraction purposes were identified for this report. This material goes through an extraction process, often carried out by companies based in Europe specialising in creating botanical extracts. Extraction companies identified in range States, did not appear to sell extracts of *V. coerulea*, although they may offer bespoke botanical extractions on application. These extracts are then sold on to finished cosmetic and personal care product manufacturers, often based in Europe, and distributed and sold worldwide.

From CITES trade statistics covering the period 2005-2015, and outreach to the cosmetic industry, the trade in live specimens and parts and derivatives of this species and *Vanda* hybrids shows a clear pattern between a defined group of CITES Parties. Much of the trade is comparatively new, commencing in 2008, which corresponds with the increased submission of patents documenting the cosmetic properties of this species. Overall, the trade is in artificially propagated live specimens and parts and derivatives of this species and is small in volume, although there are no unique HS customs tariff codes to allow an in-depth analysis. Exports of this material come from two range States, Thailand and PR China, and the major importer is France. France is also the only re-exporter of derivatives which implies the manufacture of extracts and finished products is being carried out in France. The trade in hybrids is recorded at the level of "*Vanda* hybrid" and, other than as live plants, *Vanda* hybrids are traded as four main commodities – roots, dried plants, tissue cultured plants and derivatives – all from artificially propagated sources and mirroring the trade for *V. coerulea*.

Finished products containing this species are traded globally and are regulated under CITES, but from analysis of the trade data it is unlikely that the full trade is documented or legal under CITES. This may be due to the misinterpretation or lack of knowledge of CITES among industry, deliberate circumvention of CITES regulations, poor knowledge of orchid extracts in cosmetics by CITES and enforcement authorities and the burden placed on both Parties and industry to comply with CITES implementation given the large quantities of commodities in trade. This situation is similar to other species on which CITES and industry have collaborated, including candelilla wax (*Euphorbia antisyphilitca*) and to some extent *Aniba* and *Bulnesia*. Further collaboration between CITES and the cosmetic and personal care product industry and its trade associations should continue to ensure a complete picture of this species' conservation status and its use by this industry is available. This can then be used to explore any amendments of the annotation to the Appendix II listing for orchids to exempt finished products of certain orchid species or genera.

Taxonomy

Accepted name

Vanda coerulea Griff. ex Lindl. is an accepted name.

Synonyms

The name *Vanda coerulescens* may be cited as a synonym of *Vanda coerulea*, but it is an accepted name (P. Cribb pers. comm. to M. Groves, 2016; L. Gardiner pers.comm. to M. Groves, 2016; WCSPF, 2016).

World Checklist of Selected Plant Families (WCSPF, 2016) lists the following synonyms of *Vanda coerulea* Griff. ex Lindl.:

> *Vanda coerulea* var. *rogersii* Rolfe; *Vanda coerulea delicata* Rolfe; *Vanda coerulea* f. *luwangalba* Kishor; *Vanda coerulea* f. *delicata* (Rolfe) Christenson; and *Vanda coerulea* f. *rogersii* (Rolfe) Christenson. These names only deserve forma status (white, pink or other variants occur in the wild) and should best be treated as synonyms (P. Cribb. pers. comm. to M. Groves, 2016).

CITES Orchid Checklist, Volume 3 (Roberts *et al*., 2001): lists the following synonyms of *Vanda coerulea*: *Vanda coerulea* var. *concolor* Cogn.; *Vanda coerulea* ssp. *hennisiane* Schltr.; *Vanda coerulea* ssp. *sanderae* Rchb.f.; and *Vanda coerulescens* Lindl.

UNEP (2016) lists the following synonyms of *Vanda coerulea*: *Vanda coerulea hennisiane* Schltr.; *Vanda coerulea sanderae* Rchb.f.;*Vanda coerulescens* Lindl..

Common names

Table 1 – Common / vernacular names for *Vanda coerulea*

Language	Common/vernacular name
Chinese	da hua wan dai lan, big flower ten thousand generation orchid, Large *Vanda* *Vanda* genus name **万代兰** (属) *Vanda coerulea* **大花万代兰** (Simplified Chinese) **大花萬代蘭** (Traditional Chinese) Other *Vanda* species **垂**头万代兰 *V. alpina* Lindl. **白柱万代兰** *V. brunnea* Rchb. F. **大花万代兰** *V. coerulea* Griff. **小**蓝万代兰 *V. coerulescens* Griff. **琴唇万代兰** *V. concolor* Bl. ex Lindl. **叉唇万代兰** *V. cristata* Lindl. **广**东万代兰 *V. fuscoviridis* Lindley **雅美万代兰** *V. lamellata* Lindl. **矮万代兰** *V. pumila* Hook. f. 纯色万代兰 *V. subconcolor* Tang et Wang
English	Blue vanda, Autumn lady's tresses orchid
French	orchidée violette
Indian	Rangpu (Tirap District, Arunachal Pradesh)
• **Assamese**	Bhatou Phul
• **Mizo**	Lawh-lei
• **Sanskrit**	Vandara, Vandaka, vandaar
• **Manipuri**	Kwak lei

Italian	orchidea blu
Myanmar	Moe lone hmine/ Moe-lon-hmaing
Thai	Fa Mui (north), Pho don ya, Pho thong
Vietnamese	Huệ dà

Industry names

Vanda Coerulea Extract, blue orchid extract, Vanda coerulea, Orchidée Bleue Biogreen, Blue Orchid Biogreen, Blue Orchid Oily Extract.

Identification

Vanda species can vary considerably in the size, shape and colour of their flowers. In the past, identification of *Vanda* from other orchid genera would have taken leaf shape into consideration as this genus fell into two leaf types - terete and strap. However, due to recent taxonomic revisions of *Vanda* and the inclusion of a number of other genera, dependence on leaf shape alone for identification is now problematic (D. Roberts pers. comm. to M. Groves, 2017; A. Shuiteman, pers. comm. to M. Groves, 2017). Due to mis-identification, *V. coerulea* hybrids are mis-sold as *V. coerulea* and studies of this species in the wild in Thailand and Myanmar revealed a high degree of variability related to flower and flowering traits. The zigzag raceme and the inflorescent emerging from the fifth leaf or higher trait are also exhibited by some hybrids (Wannakrairoj, 1999).

Distribution

This species is an epiphytic orchid growing on exposed branches of deciduous and evergreen trees, particular on *Pinus* spp., *Quercus* spp., *Lithocarpus* spp., *Termainalia* spp., *Sterospermum* spp. and *Shorea* spp. at elevations of 900–1500m. This species prefers cooler temperatures and bright sunlight in order to flower. Originally discovered and only known from the Khasia Hills, India, the distribution is now recognised as considerably larger. However, detailed up-to-date field studies of its current distribution have not been carried out. Species + gives the distribution as India, Myanmar, People's Republic of China (PR China) and Thailand (UNEP, 2016).

The following range States were identified (citations provided):

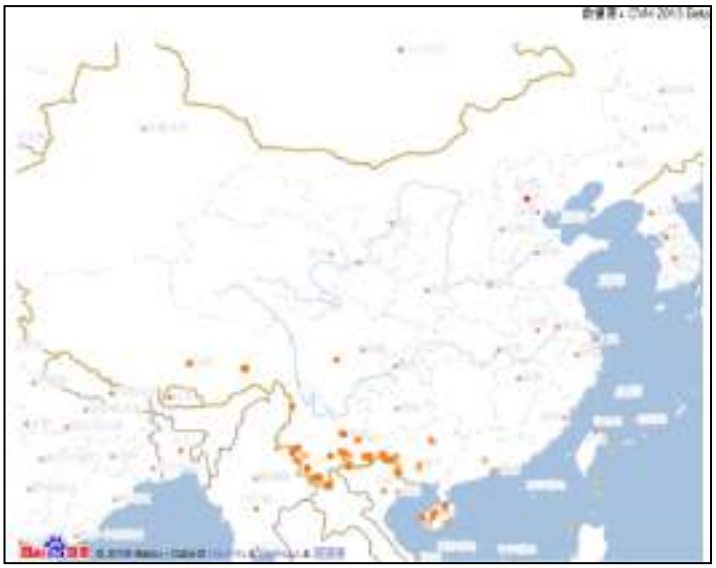
Bhutan - Although not recently authenticated, it is considered likely to occur in remote sections of Bhutan (WCSPF, 2016), although the Flora of Bhutan is to a large extent based on collections from herbaria outside of Bhutan (Orchid Conservation, 2012).

PR China - Found on tree trunks in open forests or along rivers at 1000-1600 m in southern Yunnan Province (Teoh, 2016; Flora of China, 2016).

Fig. 1 - Distribution Map for *Vanda coerulea*

Source - http://aeridinae.e-monocot.org/content/vanda-coerulea

Fig. 2 – *Vanda coerulea* distribution in China



Source - http://www.eflora.cn/sp/Vanda

India - Scattered populations are found in the north-eastern States of Assam, Arunachal Pradesh, Manipur, Meghalaya (in the Khasi and Jaintia Hills at 1,300m), Mizoram and Nagaland (De& Medhi, 2014).

Lao People's Democratic Republic - Little data is available on the distribution of this species but it is considered likely to occur in Laos. A small number of specimens have been identified in the mountains of Xiangkhoang Province (M. Motes, pers. comm. to M. Groves, 2016; A. Shuiteman, pers.comm. to M. Groves, 2016; Renziana, 2013).

Myanmar - Found in Chin, Kachin, Shan, and Yangon States and the forests of Shan State of Myanmar (NDF Workshop, 2008).

Nepal – No information on the distribution of this species in Nepal was identified, but it is considered likely to occur in Nepal. The Orchidaceae section of the Floral of Nepal is currently under completion and this species is not found under the Annotated Checklist of the Flowering Plants of Nepal (eFloras.org, 2016; WCSPF, 2016)

Thailand - Scattered populations occur from the mountain chain in Chiang Mai and Mae Hong Son Provinces, to the mountain chain in Lampang and Tak Provinces, and a few in the western part at Karnchanaburi Provinces near the Myanmar border (CITES CoP13 Prop. 44, 2004; S. Wannakrairoj pers. comm. to M. Groves, 2016).

Viet Nam - Considered likely to occur in Vietnam. This species is not documented in the Vietnam Plant Data Centre's species lists (M. Motes, pers. comm. to M.Groves, 2016; Renziana, 2013; VPDC, 2013).

Legal / conservation status

This species has not yet been assessed for the IUCN Red List. Detailed up-to-date field studies of its current distribution, population status and trade throughout its range have not been carried out, impeding a full conservation assessment of the species. Threats throughout its range include loss of habitat, collection for local and regional use and markets and the felling of trees on which the species grows, in order to produce charcoal for fuel (Kurzweil and Lwin, 2014). These threats may have contributed to the species now only being found in inaccessible terrain, hence the lack of recorded occurrences across part of its range. The many hybrids of this species and other *Vanda* species are preferred in trade, therefore the concentration of *ex situ* propagation on these rather than *Vanda coerulea* itself may ultimately adversely affect the species (M. Motes, pers. comm. to M. Groves, 2016). There is also a general need across the species distribution to conserve selected clones of *V. coerulea* which are important for future breeding programmes (Wannakrairoj, 1998).

Bhutan - No information identified on the status of this species in Bhutan.

PR China – The proposal to transfer *Vanda coerulea* from Appendix I to Appendix II cites the populations to be large and undisturbed (CITES CoP13 Prop. 44, 2004), but more recent literature cites the species as uncommon (Teoh, 2016).

India - Following extensive over-harvesting, this species is now considered to be recovering after being listed in CITES Appendix I for approximately 25 years (see Table 3). However, it is still considered uncommon and classed as threatened (Teoh, 2016; Indian Wildlife Protection Act, 1972). There are a number of *in situ* and *ex situ* conservation projects underway in India but no known new field studies for this species (Hrahsel and Thangjam, 2015).

Lao PDR - National-level conservation assessments are absent for orchids in general in Lao PDR (Phelps, 2015).

Myanmar - National-level conservation assessments are absent for orchids in general in Myanmar (Phelps, 2015), but the species is known to be under targeted pressure from over-harvesting for local and regional trade (Kurzweil and Lwin, 2014).

Nepal - No information identified on the status of this species in Nepal, although the trade in wild orchids from Nepal to China may be affecting this species (Phelps, 2015).

Thailand - Following extensive over-harvesting, the species was listed in CITES Appendix I but is now considered to be recovering (see Table 3). The Non Detriment Finding (NDF) case study presented for *Vanda coerulea* (NDF Workshop, 2008) stated that the populations were classed as having a stable global population trend, a vulnerable global conservation status and a vulnerable national conservation status for Thailand. However, it was recognised that more research was needed to assess the rate of survival of reintroduced plants, that the achievements of NDFs are questionable and that more was needed on the population status information. There has been no update to this study and no new field studies were identified. There is on-going *in situ* and *ex situ* conservation work being carried out for this species in Thailand (S. Wannakrairoj, pers. comm. to M. Groves, 2016).

Viet Nam - Considered likely to occur in Vietnam (M. Motes, pers. comm. to M. Groves, 2016; Renziana, 2013) and there is no current information available on the status of this species. It is also not documented in any species lists or databases for Vietnam (VPDC, 2016).

Applicable national legislation regulating the collection and use of this species in outlined in Table 2. This Table also outlines the CITES classification of each country under the CITES National Legislation Project (NLP) showing the status of national legislation implementing CITES.

This species is currently listed in CITES Appendix II / Annex B (EU Wildlife Trade Regulations). For the current CITES listing history and annotations see Species + (UNEP, 2016) and Table 3.

Table 2 – National and international legislation applicable to *Vanda coerulea*

Country	Legislation
Bhutan	There are no specific acts or regulations applicable to this species and it has not been located in Bhutan as yet. However, suitable habitat for this species is afforded protection under the Forest and Nature Conservation Act (1995 – *V.coerulea* is not listed in Schedule 1 of this Act**),** Forest and Nature Conservation Rules (2006) and National Forest Policy (Gawel and Ahsan, 2014). Bhutan is listed under Category 3 of the NLP.
PR China	Wildlife legislation is built around the 1988 Wildlife Protection Law. The 2006 Regulation on Administration of Import and Export of Endangered Wild Animals and Plants, is aimed specifically at the protection of CITES-listed species, as well as species under special state protection and the 1992 Regulations for the protection of terrestrial wildlife which implement the Wildlife Protection Law, and address species which are precious, endangered, beneficial or of important economic and scientific research value (terrestrial wildlife regulations, Art. 2). The State Forestry Administration, which lies directly under the State Council, is responsible for the nationwide management of terrestrial wildlife (Wildlife Protection Law, art. 7). China (including Hong Kong SAR) is listed under Category 1 of the NLP.
India	This species is listed under Schedule VI of the 1972 Wildlife Protection Act as amended. As such harvesting, commercial use and export of plants, plant portions and their derivatives and extracts from wild plants, is prohibited (cultivated or artificially propagated plants and varieties

	are allowed for export subject to production of a certificate of utilization). Cultivation and commercial use of wild plants of this species requires a licence. All CITES Appendix II plant species obtained from the wild are prohibited from export. The export of this species (along with 28 other species), plant portions and their derivatives and extracts as such obtained from the wild except the formulations is prohibited (see http://tinyurl.com/h3obk5n and http://tinyurl.com/j3wjxp5). All formulations (includes products, which may contain portions/extracts of plants on the prohibited list but only in unrecognisable and physically inseparable form) of herbal/Ayurvedic medicines, where the label does not mention any ingredients extracted from this species are freely exportable without the requirement of any certification. Indian exports of wild-taken specimens for commercial purposes, with the exception of cultivated varieties of plant species included in Appendices I and II is prohibited (Notification No. 2 (RE-98)/1997-2002 dated the 13th April, 1998) (UNEP, 2017). India is listed under Category 2 of the CITES NLP.
Lao People's Democratic Republic	Restrictions limit the harvest of forest products (including orchids) to production forests with sustainable management plans (Lao Forestry Law No.6/NA), although there is also no available evidence that these plans have been developed. Legality of orchid harvesting and trading is framed by national law through The National Forestry Law (24 December 2007) N°6/NA, Wildlife Law (24 Dec 2007- N°7/NA) and the NBCA Law (Phommasoulin, 2015). Lao PDR is listed under Category 3 of the CITES NLP. https://www.iucn.org/sites/dev/files/import/downloads/piloting_cites_case_study_iucn_jul_09.pdf
Nepal	The Forest Act 1993, and Forest Regulations 2051 (1995) as amended by the Forest (Third Amendment) Rules, 2062 (2005), specifies all orchids in Nepal are protected under Schedule 3. However, the Government of Nepal published a notification on April 14th, 2008 permitting collection of wild orchids for trade (Subedi *et al*., 2013). Nepal is listed under Category 3 of the CITES NLP.
Myanmar	Since 1994 all wild orchids have been protected by national legislation under the Protection of Wildlife and Conservation of Natural/Protected Areas Law, 1994. A permit is required to harvest or sell all wild orchids. Myanmar is listed under Category 3 of the CITES National Legislation Project (NLP).
Thailand	In 1987 this species was declared as a Restricted Minor Forest Product (Forest Act, 1941) meaning collection of wild orchids from the forest is prohibited, except for research, and is not allowed for trade. However, personal consumption is limited to 20 plants or less and there are additional bans, fines and prison terms associated with their harvest from protected areas (e.g., National Park Act B.E. 2504). The Plant Act (1992) was revised to comply with the CITES, promoting artificial propagation of CITES-listed orchids and to regulate international trade. This was echoed under a Notification of the Department of Agriculture who in 1998 declared that only artificially propagated orchid plants may be exported and all relevant nurseries be registered with the Thai CITES Management Authority for flora. Also relevant for habitat protection are the 1961 National Park Act and the 1964 Forest Reserve Act (see http://tinyurl.com/ze373bf). Thailand is listed under Category 1 of the CITES National Legislation Project (NLP)
Viet Nam	There is no specific legislation regarding this species, but the protection and sustainable use of wildlife falls under the Law on Forest Protection and Development (2004). Implementing regulation for the Forest Law is the Decree No. 32/2006/ND-CP on Management of Endangered, Precious and Rare Forest Plants and Animals. Although all wild harvested terrestrial animals are not granted a CITES export permit, wild harvested orchid species can be exported (see https://cites.org/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf). Viet Nam is listed under Category 1 of the NLP.

Source: CITES National Legislation Project (NLP) 2016 updates (see CoP17 Doc. 22, Annex 3 (Rev. 1), http://tinyurl.com/golt3ph); Phelps, 2015.

Wild harvesting

Loss of habitat and over collection of plants in the past has possibly pushed this species to more inaccessible terrain, reflected in the low rate of detection of this species throughout certain parts of its range. The extent of wild collection over the last 50 years is reflected in the history of this species listing in CITES (see Table 3) and the prohibitions on collection, use and export of wild specimens put in place by most range States. Accessible populations of this species are likely to still be threatened through trade for local and regional markets (Phelps, 2015), but the large-scale international commercial demand for wild collected plants that resulted in the species being placed on Appendix I is now fed by the mass production of *Vanda* hybrids, many with *V. coerulea* included in the parentage. While *ex situ* and *in situ* conservation and propagation efforts are underway in a number of the range States, in particular India and Thailand, the lack of field studies throughout its range hampers a clear assessment of the species current conservation status and the effects of collection and trade at a local or regional level.

Table 3 – History of CITES listing for *Vanda coerulea*

CITES - Appendix	EU Wildlife Trade Regulations - Annex	Date	Proponent
Appendix II – under Orchidaceae spp. family listing		01/07/1975	
Appendix I – under Orchidaceae spp. family listing		28/06/1979	India – considered rare. The species was considered to have a much smaller distribution (cited as only India) and was threatened due to commercial over exploitation
	Annex A – under Orchidaceae spp. family listing	01/06/1997	
Appendix II – under Orchidaceae spp. family listing		12/01/2005	Thailand – it was noted that the species had a much larger distribution (cited as India, China, Myanmar and Thailand) and that because the hybrids of *V.coerulea*, rather than the wild plants, were the main commodity in commercial trade, the species did not meet the Appendix I listing criteria
	Annex B – under Orchidaceae spp. family listing	22/08/2005	

Source – Species + *Vanda coerulea*, 2016 (https://www.speciesplus.net/#/taxon_concepts/19324/legal)

Bhutan - No information on the wild collection of this species identified.

PR China - No information on the wild collection of this species identified.

India - No information on the wild collection of this species was identified, but the species is used locally for cultural or medicinal use (Teoh, 2016).

Lao PDR – Although no specific reference to the wild collection of *Vanda coerulea* was identified, the illegal trade and collection of wild orchids for the medicinal and horticulture trade in Lao PDR has been documented and references the collection of specimens of the genera *Vanda* (IUCN, 2008; Phelps, 2015). In the north of the country, two plant markets exist and orchids are mainly exported to China for medicinal uses and for horticultural purposes. Individual collectors are taking plants from the forest to sell to local or overseas buyers (mainly Vietnamese or Chinese) without any reference to sustainable harvesting. Collection of wild orchids was found to be widespread in the country and this trade is threatening many species resulting in a decline in the quantities harvested over the last two years (Information A, pers. comm. to M. Groves, 2017).

Myanmar - Cross-border trade in orchids is occurring, and wild collection in Myanmar is driven by local and regional demand; wild specimens of *V. coerulea* have been recorded for sale in local stalls in Shan State. These plants are sold in local or specialized markets along or across the Thai-Myanmar border (Christophe and Christophe, 2012; Kurzweil and Lwin, 2014).

Nepal - Nepal has an active trade in wild orchids including *Vanda* species although no specific reference to *V. coerulea* was identified. The trade appears to be for local consumption (cultural, medicinal) but also for transportation to Indian and Chinese markets (Subedhi et al., 2013).

Thailand – Due to the horticultural trade's preference for hybrids, this species is cited as rarely wild collected due to lack of demand (S. Wannakrairoj, pers. comm. to M. Groves, 2016). However, it may be in local use for medicinal, cultural or horticultural use (Teoh, 2016).

Viet Nam - No information on the wild collection of this species was identified.

Cultivation

Live plants and cut flowers

The species is cultivated in both range and non-range States (e.g. Asia, USA, Europe), but not on the mass cultivation level afforded to hybrids of this and other species of *Vanda*. *V. coerulea* has been used extensively in hybridizing programmes, crossed with other genera, such as *Rhynchostylis*, *Aerides* and *Ascocentrum*, to produce many cultivars for the cut-flower and potted live plant trade. The cross between *Vanda coerulea* and *Vanda sanderiana*, *Vanda* Rothschildiana, is a primary hybrid used extensively for orchid breeding and is included in the ancestry of many of the modern blue *Vanda* hybrids. Tissue culture propagation provides many of the plants for the cut flower and live plant trade and specimens of both this species and its hybrids can be found for sale on the Internet. Parental stock in the past has been wild collected and there is anecdotal information suggesting that improved forms may still be bred from local populations with superior qualities of colour,

size and markings. However, there is also a high probability that these forms are hybrids (M. Motes, pers. comm. to M. Groves, 2016).

Vanda coerulea, but in particular *Vanda* hybrids, are found in trade as single or multiple cut flower stems, as live plants in hanging baskets or in cellophane, as garlands, as loose blooms and as living brooches (See Fig 3).

Fig. 3 – *Vanda* hybrid brooches

Source - http://www.anco-pure-vanda.nl/en#Living Jewel and http://www.vandasusu.com/en/Stix

Any assessment of national/ international production levels/values for cut flower/live plants of this species versus its hybrids is limited given reporting by these industries is usually only recorded to "Orchid", "Orchid hybrid" "cut flower" or "live/potted plant" level (AIPH/Union Fleurs, 2016; CBI 2016). However, the qualities and desirable features of orchid hybrids mean the commercial focus is almost entirely on the hybrid production (CBI, 2016). A list of some of the *Vanda* hybrids and inter-generic hybrids involving *Vanda* is found in CoP12 Prop.12.51 (CoP12 Prop.12.51, 2002).

Thailand is by far the largest producer and exporter of *Vanda coerulea, Vanda* hybrid live plants and cut flowers. Large scale nurseries breeding this species and *Vanda* hybrids can also be found in the Netherlands (see Anco Pure Vanda http://www.anco-pure-vanda.nl/en).

Bhutan - No information was identified on the commercial live plant/cut flower production of this species or its hybrids in Bhutan.

PR China – PR China, including Taiwan PoC, has a well established cut flower and live plant industry of hybrids of V. coerulea, although the species plays a minor role in China as the hybrids of this and other genera of orchids, mainly Phalaenopsis, are preferred and many orchids are grown for domestic consumption / markets (Information B, pers. comm. to M. Groves, 2016). Again, much of the industry data is limited to either "orchid" or generic orchid names. Yunnan Province, where the species is located, is one of the largest floriculture production regions in PR China. Orchids are amongst the plant species grown for cut flower production with Kunming, Hainan, Yunnan, Shanghai, Sichuan, Zhejiang and Guangdong among the top producing areas (NABSO Kunming, 2008). Also, see Box 1.

India – India has a well established commercial orchid cut flower and live plant industry. Nurseries, including those specialising in this species and hybrids, can be found through

centralized Internet sites (e.g. Orchid Mall https://www.orchidmall.com/plants2.htm - see Fig. 4). Smaller or specialist orchid nurseries may feed into larger centralised supplier nurseries or companies (e.g. Orchid Asia products are supplied by nurseries throughout Asia – see Fig.4). This species is cultivated in the National Orchidaria of the Botanical Survey of India at Shillong and Yercaud.

Fig. 4 – *Vanda* hybrid production in India

Source – Orchid Asia http://www.orchidsasia.com/vanda.htm

Lao PR – This species is found in very low level cultivation in Lao PDR . Only four nurseries cultivating orchids have CITES certificates for exporting orchids. (Information A, pers. comm. to M. Groves, 2017).

Myanmar – Orchids are culturally important in Myanmar and the current cultivation of orchids, including *Vanda* species, is characterised as a "low input – low output production". The production is cited as small scale with a limited use of greenhouses, irrigation, etc and the orchids produced exclusively for the domestic market (Netherlands Embassy, 2014).

Nepal - No information was identified on the commercial live plant/cut flower production of this species or its hybrids in Nepal.

Thailand – Thailand has a long standing, well established commercial nursery production of this species and its hybrids (see Fig. 5) for both the live plant and cut flower trade which commenced in the 1970s and 1980s. In 2010 Thailand ranked first in tropical orchid exports with cut flowers valued at USD 200 million a year. Orchid exports to Japan used to account for half of Thailand's shipments in terms of both volume and value but the USA, Taiwan, China, Republic of Korea and Europe, in particular the Netherlands, account for large markets for Thai orchids (Bangkok Post, 2011; Vietnam + 2016). Nurseries specialising in live / potted plants of this species and its hybrids can be found in Thailand with much of the stock grown from tissue culture material (see Vanda Su-Su and Suphachadiwong Orchids, 2014). Key areas within Thailand for orchid production are Bangkok, Samutsakorn, Nakornpathom and Ratchaburi (NABSO Kunming, 2008).

Fig. 5 – *Vanda coerulea* hybrid production in Thailand

Source- Preecha-Pranom Yoosri Orchids Farm (PPY Orchids Farm), Tha Maka, Kanchanaburi, Thailand https://www.facebook.com/pg/ppyorchids/photos/

Viet Nam - No specific reference to the commercial growing and sale of this species or its hybrids was found in Viet Nam (Nabso Kunming, 2008).

Cultivation specifically for extraction purposes

Extracts of *Vanda coerulea* are obtained from any part of a plant (dried or live), in particular the stems. Information from the cosmetic industry suggests that the raw material for use in the manufacture of these extracts and for research is cultivated in Europe, in particular France and Switzerland, and in range States, in particular PR China and Thailand . Companies manufacturing extracts of this species were identified in Europe, but there appears to be no companies manufacturing orchid extracts in Thailand (S. Wannakrairoj, pers. comm. to M. Groves, 2017). Companies in PR China can manufacture botanical extracts to order (Information B, pers. comm. to M. Groves, 2016). See TRADE section on the volumes of raw and processed material in trade.

See Annex I for information on extract production from orchids. Box 1 shows one marketer of *Vanda coerulea* extracts who is involved in orchid conservation, sustainability issues and cultivation of this species and its hybrids for research and use of raw material in their products in PR China.

Box 1 – LVMH 2015 Environmental Report

"...biodiversity is one of Guerlain's six CSR issues at stake; our strategy consists of creating sustainable industries for our favourite natural ingredients. That is why Guerlain decided to team up with several organisations and local stakeholders in a variety of programmes including:

- Orchids & TianZi: a global commitment Guerlain has created a unique research centre for orchids called the 'Orchidarium', which has three hubs: a basic research laboratory in Strasbourg (France), an experimental garden in Geneva (Switzerland) and an exploratory reserve in Tianzi (Yunnan, China). In 2009, we signed a ten-year Sustainable Development philanthropy agreement with Minguo Li Margraf, Head of the Tianzi Centre. A partnership based on three flagship actions: - The regeneration and conservation of the ancient rainforest thus contributing to the development of the local economy, - **Introducing and cultivating all types of orchids above and beyond our own raw material requirements¬: 10,000 orchids have already been planted since 2009**, - Protecting the region's flora and fauna. Tianzi orchids were certified Organic by Ecocert in 2014.
- Short film on the TianZi Nature Reserve - https://www.guerlain.com/int/en-int/skincare/orchidee-imperiale

For several years, our service providers and suppliers have been made aware of our sustainable development approach: ..... In order to go further and formalise our commitment, we sent over 600 suppliers our "Responsible Procurement Charter" drafted by the LVMH Group's Perfumes & Cosmetics Branch in 2014. ..... All suppliers must complete a self-assessment in order to obtain a score. An analysis was conducted by the HA coordination unit of the Perfumes & Cosmetics branch to compare scores for suppliers in the same family, to define the best in class in each category, and to define individual action plans for each supplier so that they can continue to improve (LVMH's Supplier's Code of Conduct https://r.lvmh-static.com/uploads/2014/10/lvmh-suppliers-code-of-conduct.pdf) .

For example, we are the first Perfumes & Cosmetics House to have been awarded the "Biodiversity and Climate" label by the Ecocert organisation ..... Since 1828 and the House's first factory in Paris, Guerlain has always produced its products in France".

Source – LVMH 2015 Environmental Report http://tinyurl.com/zrvmwne LVMH is the parent company of Guerlain.

Commercially traded forms

Raw material

- **Stems** – stems from artificially propagated sources are in commercial trade. Extracts, for use as a cosmetic ingredient, can be made from the stems of *Vanda coerulea* and are often cited as the preferred part of the plant to use (see Annex II for patents citing the use of *Vanda coerulea* as a cosmetic ingredient).
- **Roots** – roots from artificially propagated sources are in commercial trade. Extracts, for use as a cosmetic ingredient, can be made from the roots of *Vanda coerulea.*

The use of raw material in traditional medicines*:*

- **Traditional Chinese medicines (TCM)** – this species is not listed in the Chinese Pharmacopeia (2015 version) and no information on the commercial use of this species in TCM was identified.
- **Ayurvedic and other traditional Indian medicines** - Indian vedic scriptures mention orchids under the general name "VANDA" but this term mainly relates to *Vanda tessellata*. This species does not appear to be in general use in modern Ayurvedic medicine, particularly in Europe (Dr Kumar, pers. comm. 2016; Subrat *et al*., 2002) and is more likely used on a local level or as a folk medicine:
    - **Leaves -** the juice from the leaves of *Vanda coerulea* is cited as being used to treat dysentery and diarrhoea and is applied to the skin to treat skin diseases (Teoh, 2016)
    - **Flowers -** the juice from flowers are cited as being used as eye drops for controlling glaucoma, cataract and blindness by the tribal people of NE India (Teoh, 2016).
- **Other traditional medicines –** *Vanda* species are known to be used in traditional medicines in Bhutan, Nepal, Myanmar and Thailand (Teoh, 2016). However, no specific reference was identified to the use of *V. coerulea*.

Processed forms

- **Fragrances** - this species was not found in trade as a fragrance ingredient (M. Vey, pers. comm. to M. Groves, 2016). See Annex... for more information on the use of orchids in fragrances.
- **Dried plants** – dried plants from artificially propagated sources are in commercial trade (see TRADE section). Extracts, for use as a cosmetic ingredient, can be made from dried plants of *V. coerulea.*
- **Derivatives** – derivatives from artificially propagated sources are in commercial trade
- **Oil** – oil from artificially propagated sources is in commercial trade.
- **Cultures** – tissue cultures from artificially propagated sources are in commercial trade.
- **Extracts** – extracts from artificially propagated sources are in commercial trade. Brinckmann (2014) identifies one extract manufactured from this species – Vanda Coerulea Extract. Table 4 shows the source of raw material used in the manufacture of this extract (Industry, 2016).

Table 4 – Source of raw material to manufacture Vanda coerulea extract

Orchid Type	Country of origin	Source	Cultivation	Gatherer	Part used	Process country	Supplier type	Extraction type	Form	Shelf life	Post transformation	Finished product INCI name
Species	China	A	Jungle farming	Local people	Stem	France	Small-scale extraction firm	Butylene glycol*	Liquid	12 months	No other process	Orchid extract
Hybrid	Thailand	A	Nursery	Raw material supplier	Stem	France	Small-scale extraction firm	Butylene glycol*	Liquid	12 months	No other process	Orchid extract

Source – Industry (2016). ***Butylene glycol** is a chemical compound (1,3-butanediol)—a colourless organic alcohol used in the following ways: as a solvent (helps other products dissolve in water), as a viscosity-decreasing agent (to thin creams and gels so they're easier to use), and as a conditioning agent.

Patents outlining the potential of this species as a cosmetic ingredient and the manufacture of the extracts can be found in Annex II.

A number of other extracts manufactured from this species were identified in trade:

Bacillus/Monascus/Vanda Coerulea Callus/Rice Bran Ferment Filtrate (Ingredients / Fragrance)

INCI Name: Bacillus/Monascus/Vanda Coerulea Callus/Rice Bran Ferment Filtrate

INN Name: None stated in CosIng database

CAS #: None stated in CosIng database

EC#: None stated in CosIng database

HS Code: See Annex III for HS codes

Mono ID: 28497

Functions: skin protecting, emollient, skin conditioning, antiseborrheic (preventing/alleviating excessive secretion of sebum) component of cosmetic products and personal care products.

This is a filtrate of the product obtained by the fermentation of the callus of *Vanda coerulea* and *Oryza Sativa* (Rice) Bran by the microorgansisms *Bacillus* (bacteria) and *Monascus* (genus of mould). No patents were found under "Bacillus/Monascus/Vanda Coerulea Callus/Rice Bran Ferment Filtrate"(Incihaku, 2016). Marketers of this product include:

- Cardinal Pharma S.A. – il. Gen.J.Sowinskiego 5A, 91-485, Lodz, Poland
- Anri Japan – 4-1-67-606, Hachiman, Ichinomiya, Aichi 491-0903, Japan, Phone:81-586-43-0288

Blue Orchid Oily Extract (acetate)

No information was identified on this extract other than its manufacturing process. It is made from the aerial and flowering tips of *Vanda coerulea* harvested from artificially propagated (tissue cultured) plants cultivated in a French nursery selling orchids for the horticultural trade. This material is then used by a French extraction company to produce the blue orchid oily extract (acetate). Maceration of the aerial part/flowering tops in sunflower oil is followed by filtration. The extract is then added to oily finished products and shipped worldwide (CTPA, pers. comm. to M. Groves, 2017).

Marketers of this extract include:

- Greentech - Bipôle Clermont Limagne, 63360 Saint Beauzire, France

Marketers of the finished products containing this extract include:

- Clarins - SA 4 rue Berteaux Dumas, 92200 Neuilly sur Seine, France https://tinyurl.com/lozdmdx

Methods of extraction

A general description of how botanical extracts are processed for use in cosmetic and personal care products is provided below. These are either used to make a claim of the plant being present, or to give a specific activity to a skincare product.

Any part of a plant, or a whole plant, can be used and the material is usually dried and immersed whole or crushed in a solvent (chemical, water, butylene glycol) with between 10-25 kg of plant material per 100kg of solvent. The solvent could be natural or synthetic, and oil or water soluble. The mixture is stirred and left to macerate for as long as necessary. If the extraction process requires a specific level of active chemicals in the solvent, this is monitored and the maceration is stopped once the correct level is achieved. The extract is then chilled and filtered to remove the plant material and produce, as far as possible, a clear extract, or the filtrate may be dried and crushed to produce a fine powder. Dependent again on the requirements, the extract may be decolourised (using activated charcoal) or preserved (water based extracts). This process is mostly considered to be chemical (by extracting the active chemicals into a solvent) and most of the extracts are liquid so they can easily be added to skincare liquid formulations (Alban Muller short film on extraction process, 2017; R. Borner, pers. comm. to M. Groves, 2016).

Manufacturers and selected finished products in trade

The definition of a finished product in the CITES Glossary is for finished products packaged and ready for retail trade "*Product, shipped singly or in bulk, requiring no further processing, packaged, labelled for final use or the retail trade in a state fit for being sold to or used by the general public*".

While researching the use of this species, it was noted that the generic name "blue orchid" is used widely in cosmetic and personal care products. As with fragrances, many of these products do not contain extracts of this or any other orchid and are likely to be reconstructions of the orchid fragrance or the name is cited as part of a marketing strategy.

The following finished products containing *Vanda coerulea* extract were found in trade (all are available for sale on the Internet):

Product name - Clarins Blue Orchid Face Treatment Oil

Marketer: CLARINS SA 4 rue Berteaux Dumas, 92200 Neuilly sur Seine, France Website : https://tinyurl.com/lozdmdx

Ingredients: Corylus Avellana (Hazel) Seed Oil, Pogostemon Cablin Oil, Parfum/Fragrance, Helianthus Annuus (Sunflower) Seed Oil, Tocopheryl Acetate, **Orchid Extract (Vanda coerulea),** Linalool, Limonene, Coumarin, Eugenol.

Product name: Orchidée Impériale Eye and Lip Cream

Marketer: Guerlain SA, 125, rue du Président Wilson, 92593 Levallois Perret Cedex, France. Website : http://www.guerlain.com/int/en-int/orchidee-imperiale-eye-and-lip-cream

Ingredients: Vanda coerulea

Product name: Nair Toffee Apple Sugar Wax

Marketer: Church and Dwight Co.Inc., Princeton South Coporate Centre, 500 Charles Ewing Boulevard, Ewing, New Jersey 08628 Phone -1-800-524-1328, USA (they note a number of international partners/sites in Australia, Canada, China, France, and the UK). Website: http://www.churchdwight.com/index.aspx

Product name - Nair Salon Divine Sensual Orchid Sensitive Wax

Marketer: Church and Dwight Co.Inc., Princeton South Coporate Centre, 500 Charles Ewing Boulevard, Ewing, New Jersey 08628 Phone -1-800-524-1328, USA (they note a number of international partners/sites in Australia, Canada, China, France, and the UK). Website: http://www.churchdwight.com/index.aspx

Product name: Mila Moursi Shower Gel

Marketer: Mila Moursi, 9255 W Sunset Blvd, Los Angeles, Los Angeles, California, 90069, USA. Website: https://www.milamoursiskincare.com/

Ingredients: Water, Sodium Lauryl Sulfoacetate, Disodium Laureth Sulfoacetate, Disodium Laureth Sulfosuccinate, Cocomidopropyl Hydroxysultaine, Sodium Cocoyl Apple Amino Acids, Glycerin, PEG-150 Disterate, Laureth-2, PEG-7 Glyceryl Cocoate, PPG-26 Buteth-26, PEG-40 Hydrogenated Castor Oil, Fragrance/Parfum, Althae Officinalis Leaf Extract, **Vanda Coerulea Extract**, Dimethicone, Hydrogenated Lecithin, Sodium Hyaluronate, Phenoxyethanol, Caprylyl Glycol, Chlorphenesin, Sodium Chloride, Sodium Hydroxide.

Trade

CITES trade statistics were compiled from the CITES Trade Database, for the period 2005-2015. It should be noted that this data often contains discrepancies between the exporter and importer reported quantities. Also, artificially propagated live plants of *Vanda* hybrids under annotation [10], applicable to this species from 2005, and cut flowers from artificially propagated plants (point c) annotation #4), applicable to this species from 2007, are exempt from CITES regulation. Reporting of the trade in hybrids is only provided to the level of "*Vanda* hybrid" and does not include specific information on the ancestry / parentage of the hybrids. Live plants, stems, flowers, roots, leaves or cell lines from tissue cultured plants may all be used to produce orchid extracts. There are no known species-specific Harmonised System (HS) tariff codes that would enable tracking import / (re)export trade of this species. There are specific codes for live, raw, semi-processed or processed products of orchids or products likely to contain orchids (see Annex III for a list of HS codes per county per product).

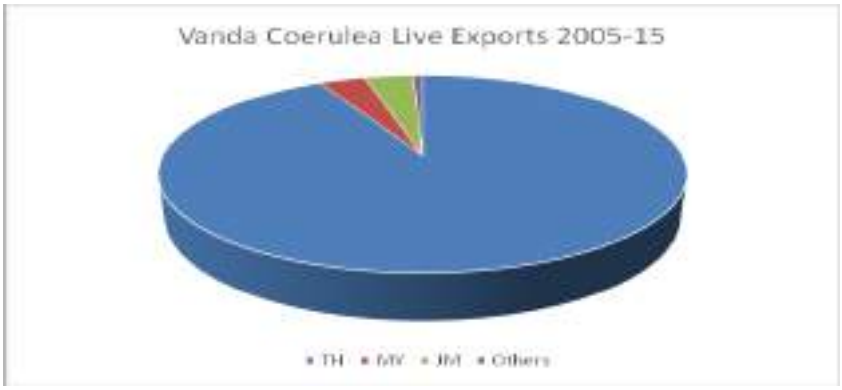
Live plants

The vast majority of trade in live plants of *Vanda coerulea* is in artificially propagated specimens. There is a discrepancy between the amount reported by the exporter (12,694 plants) and the importer (4,533 plants). The main exporter is Thailand (see Fig.6) and the Netherlands is the largest importer followed by PR China, the US, Japan, Germany and Switzerland.

While the majority of live plants in trade appear destined for the horticultural industry, the fact that parts of live plants can be used for extraction purposes and some of the importing

countries are home to large cosmetic manufacturing companies suggests that this trade could supply material for the production of *V. coerulea* extracts included in finished cosmetic products.

Fig. 6 - Exporters of live plants of *V coreulea* (2005-2015)



Tissue cultured plants

Trade in artificially propagated tissue cultured plants is comparatively new, commencing in 2013 and very small. There is one record of 10 cultures exported to France from Thailand in 2013.

Raw material

Roots

Trade in roots is low in volume and all from an artificially propagated source. There are two records of trade: 1kg of roots exported by Thailand to France in 2007, and 2800kg re-exported by Switzerland (origin China) to France in 2011.

Table 5 shows the trade in artificially propagated stems and possibly reflects the use of stems to make extracts.

Table 5 – Trade in stems of *V. coerulea* (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2007	FR	TH			0.1	stems	kg	T	A
2010	CH	CN			100	stems	kg	T	A
2010	FR	TH		31.5		stems	kg	T	A
2011	FR	TH		75	94	stems	kg	T	A
2012	FR	TH		52		stems	kg	T	A
2013	FR	TH		23		stems	kg	T	A
2014	FR	TH		26		stems	kg	T	A
2015	FR	TH		28		stems	kg	T	A

Processed material

Dried Plants

Table 6 shows the trade in artificially propagated dried plants. This trade follows the same trade flow as that of stems and roots of *Vanda coerulea*.

Table 6 – Trade in dried plants of *V. coerulea* (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2007	FR	TH		16	2	dried plants	kg	T	A
2008	FR	TH		25		dried plants	kg	T	A
2011	CH	CN		2800		dried plants	g	T	A
2011	FR	CH	CN		2800	dried plants	g	T	A
2011	FR	TH		2		dried plants		T	A
2012	FR	FR			1	dried plants		T	A
2012	FR	TH		900		dried plants	g	S	A
2012	FR	TH		10		dried plants	kg	T	A
2012	FR	TH			62.8	dried plants	kg		A
2013	FR	TH		10		dried plants	kg	T	A
2013	FR	TH			33	dried plants	kg		A
2013	FR	TH		15		dried plants		T	A
2014	FR	TH			26	dried plants	kg		A

Oil

Table 7 shows that reporting of oil from artificially propagated sources only commenced in 2015. The CITES definition of oil provided in *Guidelines for the preparation and submission of CITES annual reports (2011)* is "*oil – e.g. from turtles, seals, whales, fish, various plants*". It does not specify whether the oil is unprocessed or in the form of a finished product.

There has been a boom in the use of cosmetic face oils over the last two years which may account for this trade, or the oil may be an ingredient in a new product line. One finished product that may be contributing to these trade figures is Clarins Blue Orchid Face Treatment Oil, although this product has been available since 1965. From outreach to the cosmetic industry, oil used in this product is sourced from the aerial and flowering tips of artificially propagated (tissue cultured) plants grown in France. These parts are then sent to an extraction company in France who produce Blue Orchid Oily Extract (acetate) and this is then used by Clarins in their finished products (Clarins states that the majority of their products are manufactured in France). The role Switzerland is playing in this trade is unclear and further clarification from the cosmetic and personal care industry is required.

Table 7 – Trade in oil of *V. coerulea* (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2015	BA	SI	FR		540	oil	ml	T	A
2015	BG	FR	CH	2100		oil	ml	T	A
2015	CH	FR	FR		716.9087	oil	l	T	A
2015	DE	CH	FR	24.48		oil	l	T	A
2015	FI	CH	FR	5250		oil	ml	T	A
2015	GB	CH	FR	36540		oil	ml	T	A
2015	HU	CH		2850		oil	ml	T	A
2015	PL	CH	FR	39290		oil	ml	T	A
2015	RO	CH	FR	2550		oil	ml	T	A
2015	RS	SI	FR	1200	1200	oil	ml	T	A
2015	SI	CH	FR	6560		oil	ml	T	A

Derivatives

The CITES definition of a derivative is provided in Notification 2011/019 *Guidelines for the preparation and submission of CITES annual reports* (2011) as "*derivatives (other than those included elsewhere in this table)*" and in the CITES Glossary as "*Any processed part of an animal or plant (e.g. medicine, perfume, watch strap*)". The definition indicates that the product has been processed, but not whether it is a finished product. Table 8 shows the trade in derivatives of *V. coerulea.* The unit of quantity is all but absent (derivatives should be reported in units of kilograms or litres) making it difficult to interpret this trade in terms of assessing its volume. The majority of trade is from artificially propagated material originating in China and Thailand and re-exported by France. In the case of this trade data, outreach to industry has confirmed that these derivatives are finished products containing *V. coerulea* extract that are re-exported to Japan, Turkey and Switzerland (Industry, 2017).

Table 8 – Trade in derivatives of *V. coerulea* (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2011	CH	FR	TH		196	derivatives		T	A
2011	JP	FR	TH		230	derivatives		T	A
2012	JP	FR	CN		6.2	derivatives		T	A
2012	JP	FR	TH	173.75	64.62142	derivatives		T	A
2013	JP	FR	CL	10.7		derivatives		T	A
2013	JP	FR	CN	7.8	26.64381	derivatives		T	A
2013	JP	FR	TH	23	29.61524	derivatives		T	A
2013	TR	FR	CN		8.044286	derivatives		T	A
2013	TR	FR	TH		17.64238	derivatives		T	A
2014	CH	FR	CN		48.00476	derivatives		T	A
2014	CH	FR	TH		80.00476	derivatives		T	A

2014	JP	FR	CN	183.95	128.6162	derivatives		T	A
2014	JP	FR	CN	1.2		derivatives		T	W
2014	JP	FR	CN		1.714286	derivatives			A
2014	JP	FR	TH	220.15	190.9033	derivatives		T	A
2014	JP	FR	TH	1.2		derivatives		T	W
2014	JP	FR	TH		3.428571	derivatives			A
2014	TR	FR	CN		125.0886	derivatives		T	A
2014	TR	FR	CN		0.571429	derivatives			A
2014	TR	FR	TH		205.5186	derivatives		T	A
2014	TR	FR	TH		1.142857	derivatives			A
2015	CH	FR	CN		25	derivatives		T	A
2015	CH	FR	TH		25	derivatives		T	A
2015	DE	CH	FR	32760		derivatives	ml	T	A
2015	JP	FR	CN		272	derivatives		T	A
2015	JP	FR	TH		293	derivatives		T	A
2015	TR	FR	CN		278	derivatives		T	A
2015	TR	FR	TH		286	derivatives		T	A

Extracts

Table 9 shows that the trade in extracts is comparatively recent, commencing in 2014. A definition of extract is provided in *Guidelines for the preparation and submission of CITES annual reports (2011*) as "*extract – usually plant extracts*" and in the CITES Glossary as '*any substance obtained directly from plant material by physical or chemical means regardless of the manufacturing process. An extract may be solid (e.g. crystals, resin, fine or coarse particles), semi-solid (e.g. gums, waxes) or liquid (e.g. solutions, tinctures, oil and essential oils)'*. The preferred unit of reporting is in kilograms or alternatively litres. The trade follows a similar pattern to other parts and derivatives of this species with source material imported from PR China and Thailand by France, Switzerland and Germany. The major importing countries of extracts from France are Switzerland, Japan and Turkey. As shown in Table 4, one of the major suppliers and users of *Vanda coerulea* extract confirmed that, while material such as stems is imported from Thailand and China, processing usually takes place in France. Further confirmation on the trade in extracts is required from the cosmetic and personal care product industry and extraction firms in order to establish where this processing takes place.

Table 9 – Trade in extracts of *Vanda coerulea* (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2014	CH	FR			50	extract	kg	T	A
2014	FJ	FR			5	extract	kg	T	A
2015	CH	FR	CN		0.018525	extract	l	T	A
2015	CH	FR	TH		1.53E-05	extract	kg	T	A
2015	CH	FR	TH		0.120005	extract	l	T	A
2015	IE	CH	FR	14.4		extract	l	T	A
2015	JP	FR	CN		1.465922	extract	l	T	A

2015	JP	FR	TH		2.677923	extract	l	T	A
2015	NO	DE	FR		180	extract	ml	T	A
2015	TR	FR	CN		0.01413	extract	l	T	A
2015	TR	FR	TH		0.12612	extract	l	T	A

Vanda hybrids

V. coerulea hybrids have been cited in trade as a source of material used in cosmetic ingredients, such as extracts (see Table 4). The CITES trade data does not record the ancestry of *Vanda* hybrids and when the trade in their parts and derivatives is examined it shows a similar pattern as that for parts and derivatives of *V. coerulea*. Tables 10-13 show that *Vanda* hybrids, other than as live plants, are traded as four main commodities – roots, dried plants, tissue cultured plants and derivatives – all from artificially propagated sources.

As with the trade in a number of *V. coerulea* commodities, the trade in *Vanda* hybrids is comparatively new, dating from 2008 onwards. Table 10 shows, as with the trade in *V. coerulea* roots, the major exporter is Thailand. Brazil and Switzerland are the major importers.

Table 10 – Trade in roots of *Vanda* hybrids (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2008	BR	TH		3300		roots		T	A
2009	BR	TH		19710		roots		T	A
2010	BR	TH		13600		roots		T	A
2011	CH	TH			163	roots	kg	T	A
2012	CH	TH			188	roots	kg		A
2012	CH	TH		1600		roots		T	A
2012	DE	TH			18	roots	kg		A
2012	NL	TH			33	roots	kg		A
2013	CH	TH			96	roots	kg		A
2013	CH	TH		320		roots		T	A
2013	NL	TH			12	roots	kg		A
2013	RO	TH			10	roots	kg		A
2014	RU	TH			4	roots	kg		A

Table 11 shows that, as with *V. coerulea* dried plants, the major exporter is Thailand, and to a lesser extent France, while France is the only importer. The Republic of Korea, which has an extensive cosmetic industry, is also recorded as an importer. Little or no quantity of units are reported for this trade.

Table 11 – Trade in dried plants of *Vanda* hybrids (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2011	FR	TH		10.5		dried plants	kg	T	A
2011	FR	TH		6		dried plants		T	A
2012	FR	FR			1	dried plants		P	A
2012	FR	FR			1	dried plants		T	A
2012	FR	TH		30		dried plants		T	A
2013	FR	TH		564		dried plants		T	A
2013	KR	TH		1350		dried plants		T	A

Table 12 shows that, as with the trade in *V. coerulea* derivatives, France is the major re-exporter of derivatives (and Switzerland and Japan are importers). The lack of a reporting unit causes difficulties in analysing this trade but it may include finished products containing *Vanda* hybrid extracts.

Table 12 - Trade in derivatives of *Vanda* hybrids (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2010	CH	FR	TH		75	derivatives		T	A
2010	JP	FR	TH		202	derivatives		T	A

Table 13 shows that, as with the trade in *V. coerulea* tissue cultured plants, the material is from artificially propagated sources, the major exporter is Thailand and the exclusive importer is France. The quantities in trade are far greater for *Vanda* hybrids (51,631 flasks 2009-2015) than for the trade in *V. coerulea* (10 flasks, 2013). Taiwan PoC and Singapore are also exporters of *Vanda* hybrid tissue cultured plants.

Table 13 – Trade in tissue cultures of *Vanda* hybrids (2005-2015)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2009	FR	TH		130		Cultures		P	A
2009	FR	TH		1100		Cultures		T	A
2010	FR	TH		29510		Cultures		T	A
2010	FR	TW	TH	100		Cultures		T	A
2010	FR	TW		100		Cultures		T	A
2012	FR	TH		200		Cultures		P	A
2012	FR	TH		72		Cultures		T	A
2013	FR	SG		18		Cultures		T	A
2013	FR	TH		260		Cultures		T	A
2014	FR	TH		1000		Cultures		B	A
2014	FR	TH		60		Cultures		P	A
2014	FR	TH		600		Cultures		T	A
2015	FR	TH		230		Cultures		B	A
2015	FR	TH		130		Cultures		P	A
2015	FR	TH		18121		Cultures		T	A

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Doc 06-11 Ind.1

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☒ ***FICHE DE SPÉCIFICATION / SPECIFICATION DATA SHEET***
☐ ***BULLETIN D'ANALYSES / CERTIFICATE OF ANALYSIS***

ORCHIDÉE BLEUE BIOGREEN (SB) /
BLUE ORCHID BIOGREEN (SB)

Référence du produit / Product reference : 400344

DLUO : 24 mois / months
STOCKAGE / STORAGE : température ambiante (15-25°C)
room temperature (15-25°C)

COMPOSITION

Orchidée bleue / Blue orchid (*Vanda coerulea*)	Fleur / Flower
Glycérine / Glycerin	
Eau / Water	
Benzoate de sodium / Sodium benzoate	
Sorbate de potassium / Potassium sorbate	
Acide citrique / Citric acid	

CARACTÉRISTIQUES ORGANOLEPTIQUES / ORGANOLEPTIC CHARACTERISTICS

	PROCÉDURES	SPÉCIFICATIONS
Aspect / Sight	GT001	Liquide / Liquid
Couleur / Color	GT002	Incolore à jaune / Colorless to yellow
Odeur / Odor	GT003	Caractéristique / Characteristic

CARACTÉRISTIQUES PHYSICO-CHIMIQUES / PHYSICAL AND CHEMICAL CHARACTERISTICS

Solubilité : 10% dans l'eau / Solubility 10% in water	GT004	Soluble
Solubilité : 10% dans l'éthanol / Solubility 10% in ethanol	GT004	Soluble
pH (direct)	GT005	3.4-4.0
Indice de réfraction / Refraction index	GT007	1.350-1.380
Densité / Density	GT008	1.020-1.100

Case Study of Vanda tessellata (Vanda roxburghii)

Commissioned by

Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

March 2017

Madeleine Groves and Catherine Rutherford

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Executive Summary

Vanda tessellata, also known by its synonym *Vanda roxburghii*, is an epiphytic orchid found in Bangladesh, India, Nepal, Myanmar and Sri Lanka. This species is known for its medicinal properties. It is used in Ayurvedic, Siddha, and Unani medicine, particularly in India, and for the production of Ayurvedic medicinal products available globally, particularly through the Internet. *V. tessellata*, along with a number of non-CITES listed plant species, such as *Pluchea lanceolata*, is traded under the Sanskrit name "Rasna", an ingredient of finished medicinal products that are in global trade. More recently this species has been investigated for its potential as a cosmetic ingredient, although no finished cosmetic products containing this species were found in trade. This species has been assessed as Least Concern by the IUCN Red List (ver 3.1), but is considered Vulnerable in Sri Lanka and Critically Endangered in parts of India. National-level conservation assessments are absent for orchids in general throughout parts of this species' range and the current population trend, area, extent and/or quality of habitat of *V. tessellata* appears to be declining. Further surveys and monitoring are required throughout its range to establish the current habitat and population status. While there is legislation prohibiting the harvesting of wild orchids throughout its range, the illegal wild collection of orchids, including *Vanda* species, for horticultural and medicinal purposes in local and regional markets is documented. Surveys have identified major markets within Southeast Asia and a medicinal trade in dried orchids for Vietnamese and Chinese consumption.

This species is in low level cultivation for the live plant trade and cut flower industry, but its hybrids are cultivated on a larger scale for these industries. However, no information on the specific cultivation of this species for its medicinal or cosmetic properties was found. *V. tessellata* is found in trade as semi-processed products and as an ingredient in finished medicinal and personal care products, mostly Ayurvedic products. Artificially propagated *Vanda* hybrids shipped under certain conditions, and certain parts and derivatives listed under the #4 annotation of the Appendix-II Orchidaceae spp. listing (e.g. tissue cultured plants), are not regulated. Also, India does not allow the export of wild collected specimens for commercial purposes of Appendix I and II species, with the exception of cultivated varieties of plant species. The short timeframe for completion of this report restricted the outreach to experts, policy makers, traders and practitioners and further outreach is required. Responses were very limited or constrained by confidentiality issues.

The CITES Trade Database shows that the trade in *V. tessellata* is comparatively low in volume. Fewer than 3,000 live plants were traded over the period 2005-2015 and the trade in parts and derivatives is comparatively recent, commencing in 2009. The CITES Trade Database records India as the only exporter of extracts, derivatives, unspecified material and medicines of this species. It is also the largest exporter of live plants closely followed by Thailand. All material in trade is from artificially propagated sources except in the case of a number of exports from India of derivatives under the source code "I" (seized or confiscated material).

Finished products purporting to contain this species are traded globally and are regulated under CITES, but from analysis of trade data it is unlikely that the full trade in these products is documented or legal. This may be due to the misinterpretation or lack of knowledge of CITES among the Ayurvedic / herbal and medicinal plant product industry and practitioners, deliberate circumvention of CITES regulations, poor knowledge of the use of orchids in medicinal products by CITES and enforcement authorities and the burden placed on all to comply with CITES implementation given the large quantities of commodities in trade. Further collaboration between CITES and the Ayurvedic / herbal medicinal plant industry and practitioners and their trade associations should continue to ensure a complete picture of this species' conservation status and its use by industry is available. This can then be used to explore any amendments of the annotation to the Appendix II listing for orchids to exempt finished products of certain orchid species or genera.

Taxonomy

Accepted name

Vanda tessellata (Roxb.) Hook. ex G.Don is an accepted name. This species is widely found in literature and trade under its synonym, *Vanda roxbughii* R.Br.

Synonyms

World Checklist of Selected Plant Families lists *Vanda tessellata* (Roxb.) Hook. ex G.Don as an accepted name with the following synonyms:

- *Epidendrum tessellatum Roxb.*
- *Cymbidium tessellatum (Roxb.)*
- *Aerides tessellata (Roxb.) Wight ex Lindl.*
- *Vanda roxburghii* R.Br.
- *Cymbidium allagnata* Buch.-Ham. ex Wall.
- *Cymbidium tesselloides* Roxb.
- *Vanda tesselloides* (Roxb.) Rchb.f.

CITES Orchid Checklist, Volume 3 (Roberts *et al*., 2001) lists the following synonyms: *Cymbidium tesselatum* (Roxb.) Sw. *Cymbidium tesseloides* Roxb., *Epidendrum tesselatum* Roxb., *Vanda roxburghii* R.Br. , *Vanda tessellata* var. *lutescens* M.E. Dalpethado, *Vanda tessellata* var. *rufescens* M.E. Dalpethado, *Vanda tesselloides* (Roxb.) Rchb.f. and *Vanda unicolor* Steud. sensu Christenson

UNEP (2017) lists the following synonyms of: *Aerides tesselata* (Roxb.) Wight, *Aerides tessellatum* (Roxb.) Wight.,, *Aerides tessellatum* (Roxb.) Wight., *Cymbidium tesselatum* (Roxb.) Sw. , *Cymbidium tesseloides* Roxb. ,*Epidendrum tesselatum* Roxb., *Vanda roxburghii* R.Br. ,*Vanda tesselloides* (Roxb.) Rchb.f., *Vanda unicolor* Steud. sensu Christenson

Common names

Table 1 – Common / vernacular names for *Vanda tessellata*

Language	Common/vernacular name
Arabic	Khartkittan
Chinese	*Vanda* genus name 万代兰 (属) Wàn Dài Lán (Shǔ)
English	Grey orchid, Checkered orchid
French	Orchidée de Ceylan, Orchidée médicinale de Ceylan, Orchidée vanda.
Indian	Rasna, Ichneumon plant (industry name)
• **Begali**	Rasna (medicinal name), Nai
• **Hindi**	Rasna (medicinal name) Banda, Persara, Perasara, Vanda, San, Nai, Alisara
• **Mumbai**	Rasna (medicinal name)
• **Sanskrit**	Rasna (medicinal name). The Sanskrit synonyms rasna (tongue like leaf), rashna (tongue like leaf), rasana (tongue like leaf), rasya (with higher degree of pungency), sugantha moola (root is fragrant), suvatha (anti rheumatic), elaparni (leaf resemble Eletteria), surpagandha (snake like odour), atirasa (with high pungency) and rasadhya (high pungency). Nai rasna, atirasa, bhujangakshi, chhatraki, dronagandhika, Elaparni, Gandhanakuli, Muktarasa, Nakuleshta, Nakuli, Palankapa, Shreyasi, Sugandhimula, Surasa, Suvaha, Vandaka, Vrikshauha, Yukatarasa
• **Marathi**	Rasna (medicinal name)
• **Unani**	Rasha (medicinal name)
• **hindi**	Banda, Persara, Rasna (medicinal name)
• **Urdu**	Banda
• **Malayalam**	Arathamaravazha, Maravanchi, Maravazha
• **Telugu**	Chittiveduri, Kanapabadanika, Mardaru, Vadanika
• **Oriya**	Ilkum
• **Kannada**	bandanike, badanika, jkeevanthige
• **Santal**	Darebanki
• **Madras**	Knapachettu
• **Madhya Pradesh**	Jarakindu, Japa
• **Kerala**	Maravazha
• **Orissa**	Banki
• **Tamil**	Vellaipunelu, Naguli, kantanakuli
Italian	Zanjabeel-e-shami
Myanmar	Taukte-thitkwa
Nepal	Parajiva, Gaaii tivaare (Gai tivare), Parajiva, Rasna
Persian	Zanjabeel-e shami
Sri Lanka	Anuradhapura Orchid, Grey Orchid, Rat-tha, Arattha, Rasni
Thai	เอืองสา มปอยอินเดีย Ueang sam poi India (in Chiang Mai), Ueang suea lek (in Bangkok), สา ม ปอยอินเดีย Sam poi din diat

Sources: Sarala, 2001 ; Teoh, 2016

Industry names

Rasna, Rasna root

Identification

Vanda tessellata is traded under the name "Rasna". Its roots can be superficially similar to other *Vanda* species or those of *Pluchea lanceolata*, the latter being another plant species traded under the name "Rasna". *Vanda* species can vary a lot in the size, shape and colour of their flowers. In the past, identification of *Vanda* from other orchid genera would have taken leaf shape into consideration as this genus fell into two leaf types - terete and strap. However, due to recent taxonomic revisions of *Vanda* and the inclusion of a number of other genera, dependence on leaf shape alone for identification is now problematic (D. Roberts pers. comm. to M. Groves, 2017; A. Shuiteman, pers. comm. to M. Groves, 2017).

Identification of different species traded under the name "Rasna"

As outlined in Brinckmann (2014), the Sanskrit name "Rasna" can apply to *V. tessellata* but also to *Pluchea lanceolata* (DC.) Oliv. & Hiern. (Asteraceae). He states that "…it's therefore possible that Ayurvedic traditional herbal medicinal products labelled as containing "Rasna" may contain *Vanda tessellata* or *Pluchea lanceolata*". A number of other plant species were identified in trade under the name "Rasna" or found in formulas using traditional plant species associated with the "Rasna" name. These include *Alpinia officinarum* Hance, J. Linn. and *Alpinia galanga* (L.) Willd.; *Saccolabium papillosum*, a synonym for various *Acampe* or *Gastrochilus* orchid species; *Polygonum* glabrum Willd.; *Ophioxylon serpentinum* L., a synonym of *Rauvolfia serpentina* (L.) Benth. ex Kurz in the Apocynaceae; *Viscum album* L.; *Withania coagulans* Dunal.; *Inula racemose*; *Tylophora asthmatica*; Dendrophthe facultata and *Aristolochia indica* (Sarala, 2001).

Currently more than 600 herbal formulas and 250 single plant drugs are included in the 'pharmacy' of Ayurvedic medicine, grouped into categories according to their effects, for example pain relief, and formulas that are prepared according to specific Ayurvedic text procedures. There are a number of issues that explain the complex application of the name "Rasna" to different plant species:

- **Names:** Many companies use synonyms or regional names for the herbs. The well accepted source of the drug "Rasna" is considered *Pluchea lanceolata,* in accordance with the classical literature. However, it can mean different species in different parts of India. This is compounded with the numerous dialects in India. For example, *Vanda roxburghii* and *Alpinia galanga* are traded under the name 'Rasna' in Bengal and South India respectively while *Pluchea lanceolata* is traded under this name in northern and western India (Punjab and Gujarat) (Joshi, *et al*., 2012). *V. tessellata* is called "Raasnaa mool" or simply "Raasnaa", while the drug indicated by the name "Raasnaa patra" is the root of *Pluchea lanceolata.* While different plant species are recognised to belong to the 'Rasna family' with "Rasna" in their medicinal name they may not be indicated for the treatment of ailments traditionally treated by "Rasna" products, such as rheumatism (Viswanathan, 2003);

- **Formulas:** many of the traditional Ayurvedic medicines have differing formula references in separate text books from various parts of India and the practices may be distinctive between each area. This can lead to different species being linked to a particular name (Subrat *et al*., 2002)

- **Properties and substitution:** high prices and unavailability of one species through over exploitation of the wild resource can lead to substitution and adulteration of drugs. If this practice continues over time the original identity of a plant may become obscure and the substitute will be considered as the original. Due to seed viability issues, poor cultivation practices and overharvesting, *Pluchea lanceolata* has become a vulnerable species in India and it has been listed as a priority species by the Ministry of Health and Family Welfare, Government of India (Arya *et al*., 2007). Therefore, substitutes or "inferior" varieties made from other species may be used. In Orissa, India where *Vanda roxburghii* (synonym of *V. tessellata*) occurs extensively in many areas, particularly in the district of Mayurbhanj, only a few local herbal practitioners agree to recognise it as "Rasna" and at best regard it is regarded as an inferior variety (Rath and Nanda, 2001). If plants have similar properties their substitution may occur. For example, *Vanda roxburghii* and *Pluchea lanceolata* have similar properties and therefore are both used under the name "Rasna" (Viswanathan, 2003)

Distribution

V.tessellata is a lowland epiphytic orchid growing on trees and rocks in dry and intermediate zones (15-700 m) occurring in Bangladesh (growing on the branches and trunks of host trees, e.g. *Albizia saman, Albizia procera, Mangifera indica*); India (Deccan Plateau, Eastern Gnats); Nepal; Myanmar (Tenasserim, Chin, Taninthayi regions); and Sri Lanka (UNEP, 2017).

Fig 1. – Distribution Map for *V. tessellata*

Source -eMonocot http://e-monocot.org/taxon/urn:kew.org:wcs:taxon:211555

Legal / conservation status

This species has been assessed as Least Concern under the IUCN Red List criteria. It appears to have a widespread distribution based on collection records, with an extent of occurrence that greatly exceeds the value for a threatened category. It is reported as abundant and common in parts of its range and it is suspected that the declines in the overall population are not sufficient to meet the criteria for a threatened category under criterion A. However, there is no numerical population data available throughout its range, and subpopulations are known to have suffered declines due to habitat loss, particularly due to the loss of mature host trees, and degradation and collection for its medicinal and horticultural use. The current population trend, area, extent and/or quality of habitat appear to be declining. Further surveys and monitoring are required to establish the current habitat and population status and to track any declines (Khela and Chadburn, 2014).

Bangladesh – Assessed as Least Concern by the IUCN Red List in Bangladesh with no immediate conservation measures reported as being necessary (Khela and Chadburn, 2014).

India – Assessed as being of indeterminate status by the IUCN Red List in the Deccan region due to lack of information, but thought to be rapidly declining in parts of India where a preliminary assessment has classified it as Critically Endangered in Madya Pradesh due to habitat loss and degradation through industrialization (Khela and Chadburn, 2014).

Myanmar – No information was available on the status of this species in Myanmar (Khela and Chadburn, 2014). National-level conservation assessments are absent for orchids in general in Myanmar (Phelps, 2015).

Nepal – No information was identified on the status of this species in Nepal (Khela and Chadburn, 2014). This species is found within protected areas in Nepal, such as the Bhagwan Mahavir (Molem) National Park in Goa and Chitwan National Park (Khela and Chadburn, 2014). Found on host plants including *Bauhinia tomentosa, Dalbergia sissoo, Eugenia* spp., *Madhuca latifolia, Prunus cerasus*, *Strychnos nux-vomica, Tamarindus indicus* and *Thespesia paulnea* (Ghimire, 2008). The *ex situ* conservation of threatened/medicinal orchids, such as *Vanda tessellata*, is being carried out in Nepal through immature seed culture, protocorm culture, micropropagation using different explants and through synthetic seed production although no indication of the scale of production was identified (OSSU, 2009).

Sri Lanka - This species is now confined to the drier zones in Sri Lanka and was once common in the forests surrounding the city of Anuradhapura (Teoh, 2016). It is now classified under the IUCN Red List as Vulnerable A2d and B2ab(i,ii,iii) in Sri Lanka. The National Red Book of Sri Lanka has reported it as one of the more dominant species of dry zones, but the population was noted to have declined heavily from 2009-2013. Habitats in Sri Lanka are noted to have been heavily impacted by large development projects in the dry zone, such as road building and urbanization. *Ex situ* cultivation is being carried out by orchid enthusiasts and a variety of colour forms are within the collection of the Dry-Zone Botanic gardens in Hambanthota in Sri Lanka (Khela and Chadburn, 2014)**.**

This species was listed in CITES under the family Orchidaceae Appendix-II listing in 1975 (UNEP, 2017).

Table 2 – National and international legislation applicable to *Vanda tessellata*

Country	Legislation
Bangladesh	Wild plants including orchids fall under the Wildlife (Conservation and Security) Act, 2012 – formerly Wildlife Protection Act, 1974. It provides conservation and safety of wildlife, forests and biodiversity by repealing the existing law relating to conservation and management of wildlife. Ensuring the protection of wild plants https://www.google.co.uk/?gws_rd=ssl#q=Bangladesh+flora+law+report+&*. Bangladesh is listed under Category 2 of the CITES National Legislation Project (NLP).
India	No legislation applicable specifically to this species was found. It is not listed under Schedule VI of The Wildlife Protection Act, 1972 which affords higher levels of protection to plant species and criteria for their export. Habitat and use of this species within these areas falls under the following acts: The Scheduled Tribe and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 allows for the right to access, use or dispose of minor forest produce for designated tribes; The Indian Forest Act, 1927; and The Forest Conservation Act, 1980. Exports of wild-taken specimens for commercial purposes, with the exception of cultivated varieties of plant species included in Appendices I and II is prohibited (Notification No. 2 (RE-98)/1997-2002 dated the 13th April, 1998) (UNEP, 2017).India is listed under Category 2 of the CITES NLP.
Nepal	The Forest Act 1993, and Forest Regulations 2051 (1995) as amended by the Forest (Third Amendment) Rules, 2062 (2005), specifies all orchids in Nepal are protected under Schedule 3. However, the Government of Nepal published a notification on April 14th, 2008 permitting collection of wild orchids for trade (Subedi *et al*., 2013). Nepal is listed under Category 3 of the CITES NLP.
Myanmar	Since 1994 all wild orchids have been protected by national legislation under the Protection of Wildlife and Conservation of Natural/Protected Areas Law, 1994. A permit is required to harvest or sell all wild orchids. Myanmar is listed under Category 3 of the CITES NLP.
Sri Lanka	This species is protected under the Fauna and Flora Protection Ordinance. Sri Lanka is listed under Category 3 of the CITES NLP.

Sources: CITES National Legislation Project (NLP) 2016 updates (see CoP17 Doc. 22, Annex 3 (Rev. 1), http://tinyurl.com/golt3ph; Phelps, 2015.

Wild Harvesting

This species is both a horticulturally and medicinally important species and it is used in Ayurvedic, Siddha and Unani medicines. Extracts from this species are cited in patents for cosmetic and personal care products (see Annex II on Articles, posters and patents).

Bangladesh - This species is wild collected from forests in Barind Tract region of Bangladesh for local medicinal uses (Siddique, 2004).

India - The aerial and climbing roots, stem and leaves of *Vanda* species are cut and dried and sold in the drug market of Uttar Pradesh, Madhya Pradesh, Bihar and Bengal (Sarala, 2001). This species is collected from the wild in the Eastern Ghats and Deccan regions of India as a snack or food source (Pulliaiah *et al*., 2016). The wild collection of leaves, flowers

and roots of this species is also recorded in the Sathiyamangalam forest division, Tamilnadu, India (Ramesh *et al*., 2012)

Myanmar - While no specific reference to the collection of this species was found, the general illegal collection and trade of orchid species for horticultural and medicinal use is well documented from Myanmar, in particular for Chinese markets. Market surveys carried out on the Thai-Myanmar border highlighted significant illegal, international trade in orchids from Myanmar into Thailand for domestic consumers. These surveys also identified major markets within SE Asia and a medicinal trade in dried orchids for Vietnamese and Chinese consumption (Phelps, 2015).

Nepal - No specific data on the legal or illegal collection of this species in Nepal was identified. However, in Nepal, orchids are under considerable threat from continued habitat destruction, degradation and fragmentation and illegal collection and trade and consumption. While further studies of this commercially important species and its potential for plant breeding and international trade are required, collection and sale of wild orchids by local Nepalese people is occurring. Large amounts of orchids are sold to local traders from China and India to feed the trade in raw materials for different traditional medicines. Due to the recent trend of using traditional medicine in western countries the demand is increasing (OSSU, 2009).

Sri Lanka - No specific data on the legal or illegal collection of this species in Sri Lanka was identified. However, the rare and attractive colour varieties of this species make it a target for collectors and traders and customs detections of smuggling have taken place (Khela and Chadburn, 2014; Rajasinghe, 2017).

Cultivation

Vanda tessellata and its hybrids are in cultivation for the live plant trade and this species is used in hybrid breeding. The hybrids are used in the cut flower trade (Chandra De. *et al*., 2014) with flowers lasting 15-60 days. Although this species is not cultivated on a mass commercial scale (M. Motes, pers. comm. to M. Groves), it was found in cultivation both within and outside of its range States. It is for sale as live plants (species and hybrids) on the Internet (£5.50 -£7.50 per seedling). It is also grown for e*x situ* conservation efforts, including under tissue culture (Prakesh et al., 2013), and is cultivated in Gurukula Botanical Sanctuary, Wayanad and Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode, Trivandrum, both in southern India. Botanic Gardens Conservation International (BCGI) (2017) cites 10 *ex situ* conservation sites worldwide where this species is being grown. It is also under cultivation in Colombo, Sri Lanka. This species is recorded growing in home gardens of Raipur, Chhattisgarh, India (Sharma et al., 2014). No specific data on the cultivation of this species in Nepal was identified (OSSU, 2009). It is not known whether seed from this species is conserved in any seed bank (Khela and Chadburn, 2014).

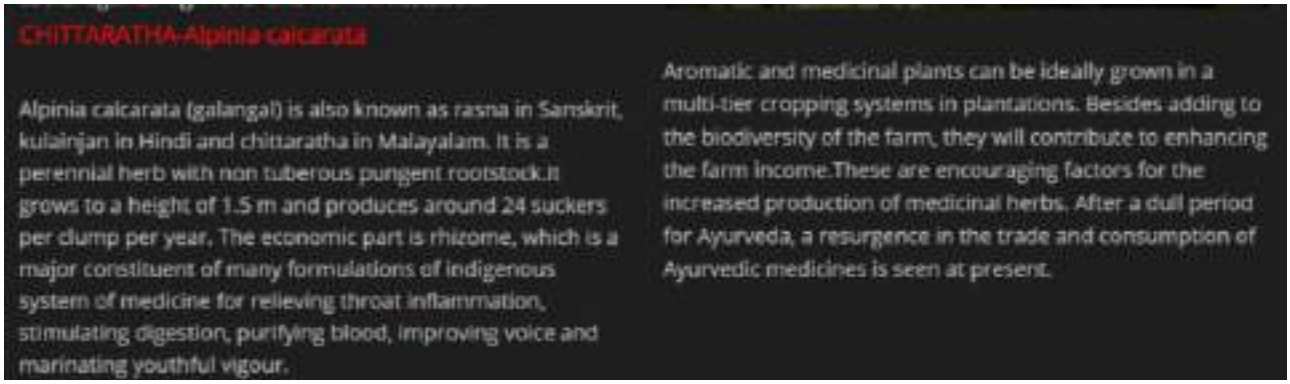
Cultivation specifically for medicinal and / or cosmetic purposes

V. tessellata is well known for its medicinal properties and has more recently been analysed for its potential as a cosmetic ingredient. The CITES trade data indicates that all living plants

and parts and derivatives of *V. tessellata* in trade are from artificially propagated sources. However, there was no information available on whether commercial horticulture nurseries found in range and non-range States grow this species specifically for its medicinal or cosmetic properties or whether there is local cultivation of *V. tessellata* for use locally and for export.

It is known that some of the other species traded under the name "Rasna" are wild collected and cultivated. For example, *Alpinia calcarata* can be found cultivated in a mainstream Indian horticultural nursery (see Fig. 2) and *Alpinia galanga* is planted locally and rhizomes harvested after 18-42 months (Farooqi *et al*., 2005). While *Pluchea lanceolata* is considered a weed in some areas of India, it is also collected in bulk from forests (Oudhia, 2010) and the estimated annual demand for this species is 3,000 tons (Albert, 2014).

Fig 2 – cultivation of *Alpinia calcarata* in orchid nursery in India



Source – Orchid Asia http://www.orchidsasia.com/herbs.htm

Commercially traded forms

This species is found in trade as both raw unprocessed material and as an ingredient in finished medicinal products. No finished products containing this species as a cosmetic ingredient were identified.

Raw material

Medicinal Use

As previously stated, this species is traded under the name "Rasna" along with a number of other plant species. However, the name *V. tessellata* is not commonly used in ingredient lists, publications, citations, etc. Rather *V. roxburghii*, a synonym of *V. tessellata*, is more commonly used in trade linking *V. tessellata* to "Rasna" products. It has been analysed for its medicinal properties including phytochemicals such as alkaloids, tannins and saponin. It is used as an aphrodisiac, (a novel aphrodisiac compound was identified in the orchid in 2013), antipyretic, analgesic and nerve tonic and used in Ayurvedic medicine for treatment of arthritis and rheumatism. The entire plant is used, particularly the leaves and roots, and local tribes in Rajasthan use it in ethnomedicine for treatment of ailments in cattle and also for bone fractures. No medicinal use is reported from Sri Lanka (Khela and Chadburn, 2014).

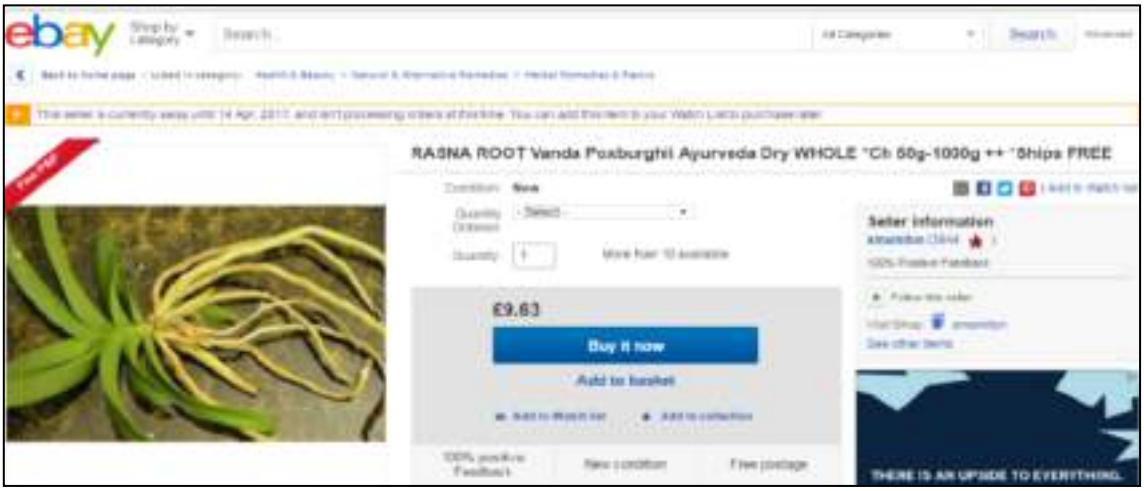
- **Whole plant -** used to treat fractures. Juice from the compressed plant is drunk as a cure-all in the Malaysian Peninsula (Teoh, 2016).
- **Leaves -** thought capable of preventing wounds from developing into sores. Leaves used to treat earache, sometimes in combination with aerial roots and neem oil. In the Deccan region of India the leaf juice is used in the treatment of certain inflammatory conditions, leaf paste to treat to treat fever (Teoh, 2016). The leaves are used by local tribes in Rajasthan in ethonomedicine for treatment of ailments in cattle and also for bone fractures (Khela and Chadburn, 2014). See Fig. 3 for an example of "Rasna" leaves found in trade.

Fig 3 - "Rasna" leaves

Source – Zeal herbs https://tinyurl.com/mczuad6)

- **Bark** - Mixed with other species, including *Shorea robusta*, for application on sores (Teoh, 2016).
- **Juice** - Several tribes in eastern tropics take juice of this species as panacea for general illnesses (Teoh, 2016).
- **Roots -** *Vanda tessellata* is used as a substitute for *Pluchea lanceolata*, particularly in northern and eastern India (Teoh, 2016). In Nepal, roots are used as an antidote to scorpion stings and to treat bronchitis and rheumatism. In India the paste of the roots is used to treat rheumatism. Roots are used as a lower priced alternative for *Acampe papillosa* and *Pluchea lanceolata*, as all of these species can be regarded as "Rasna". In the Deccan region of India tribal people use the roots as an ingredient of medicinal oils to treat rheumatism and the nervous system (Prasad et al., 2007). The roots also used to treat rheumatism, dyspepsia, bronchitis and nervous disorders and as a female contraceptive. Rasna (root of *V.tessellata*) is essential component of Asthavarga (8-wonders remedy) (Teoh, 2016). The roots are used by local tribes in Rajasthan in ethonomedicine for treatment of ailments in cattle and also for bone fractures (Khela and Chadburn, 2014). See Fig. 4 for roots for sale on eBay.

Fig. 4 – *Vanda tessellata* roots for sale on eBay



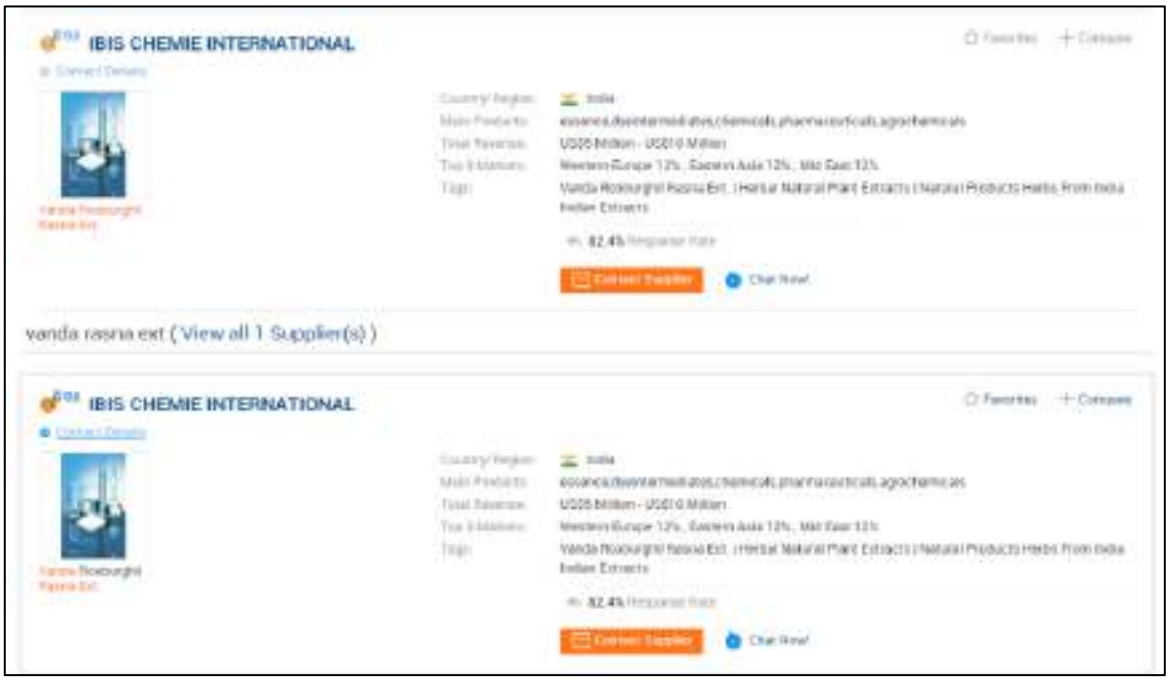
Source – eBay 2017 https://tinyurl.com/l5j7l5y

- **Stems** - in remote villages in the Chatarpur district of Madhya Pradesh, India the stems are used to treat fractures and sprains (Teoh, 2016). Stems

Processed forms

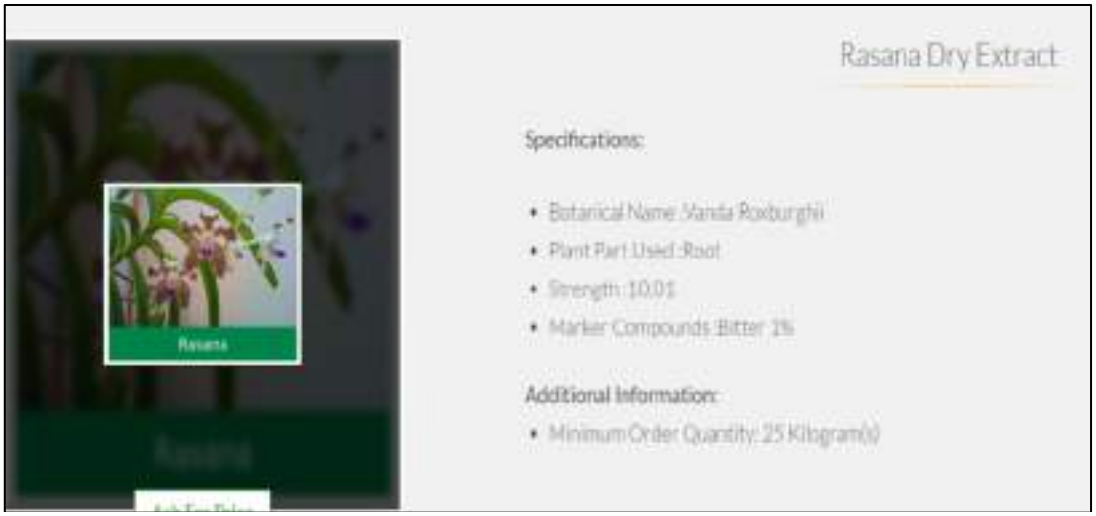
- **Stems** – this is used in the local production of pills, cooked in sugar, cooled then mixed with honey and rolled into pills (Manickagasavan et al., 2012)
- **Extracts** – For the following purposes:
  - **Medicinal** - An extract of the whole plant produced an anti-acetylcholine effect and assisted wound healing in rats. *V. roxburghii* (synonym of *V. tessellata*) contains two anti-inflammatory compounds. Liquid extract or syrup prepared from this species is used to treat dyspeptic conditions, bronchial ailments and rheumatic fever (Teoh, 2016). See Figs. 5 and 6 for examples of botanical extraction companies offering "Vanda roxburghii - Rasna" extract for sale.
  - **Cosmetic ingredient** – patents were found citing the use of extracts from *Vanda tessellata* in cosmetics and personal care products (see Annex II on patents) but no finished products were found containing this species as an ingredient.
- **Oils**- Medicinal oils to treat rheumatism, bone aches and venous disorders e.g. *Mahamasha tada* and *Madhyama Narayana taila* include this species as an ingredient (Teoh, 2016).
- **Herbal formulations** – Ancient tomes state *rasna* has strong smelling roots, a characteristic not known of *V.tessellata*. Some medical dictionaries (e.g. Sarasvathi Nighanduwa) cite three types of *rasna* – rare *mula rasna* with a smelly root; then *pathra rasna* or *V.tessellata* is extensively used by Ayurvedic physicians in India. In contemporary herb markets *V.tessellata* and *Acampe papillosa* are sold as *rasna* (Teoh, 2016). Classical Ayurvedic formulations that may contain this botanical are found in Brinckmann (2014)
- **Ear drops** - prepared from the roots. Has been used by herbalists to treat STDs including syphilis and snake and scorpion bites (Teoh, 2016).

Fig. 5 – Indian companies selling *Vanda roxburghii* Rasna extract



Source – Alibaba 2017 https://tinyurl.com/mhqt9og

Fig. 6 - Rasna Dry Extract



Source - Kaiwal Biotech, Kaiwal Biotech, No. 720, New GIDC, Gundlav, Valsad - 396035, Gujarat, India Te:+ +91-2632-237303 website: https://www.indiamart.com/kaiwalbiotech/ and http://www.indiamart.com/kaiwalbiotech/liquid-extract.html

Method of extraction

Extract patents relevant to this species can be found in Annex II. A general description of how botanical extracts are processed for use in cosmetic and personal care products is provided below, but medicinal extracts may be manufactured differently. This is either used

to make a claim of the plant being present, or to give a specific activity to a skincare product:

Any part of the plant, or a whole plant, can be used and the material is usually dried and immersed whole or crushed in a solvent (chemical, water, butylene glycol) with between 10-25 kg of plant material per 100kg of solvent. The solvent could be natural or synthetic, and oil or water soluble. The mixture is stirred and left to macerate for as long as necessary. If the extraction process requires a specific level of active chemicals in the solvent, this is monitored and the maceration is stopped once the correct level is achieved. The extract is then chilled and filtered to remove the plant material and produce, as far as possible, a clear extract, or the filtrate may be dried and crushed to produce a fine powder. Dependent again on the requirements, the extract may be decolourised (using activated charcoal) or preserved (water based extracts). This process is mostly considered to be chemical (by extracting the active chemicals into a solvent) and most of the extracts are liquid so they can easily be added to skincare liquid formulations (Alban Muller short film on extraction process, 2017; R. Borner, pers. comm. to M. Groves, 2016).

Manufacturers and selected finished products in trade

See Brinckmann (2014) for details on other finished products of this species in trade in Europe and a list of classical Ayurvedic formulations that may contain this botanical. All the following products were identified in trade on the Internet:

Product name: Tonex capsule

Marketers:

- Park Pharmaceuticals - 272, INDUSTRIAL AREA, PHASE -2, PANCHKULA-134113 Tel: +09988000028 Email sales@parkpharmaceuticals.com
  Website: http://www.parkpharmaceuticals.co.in/product.html
- Growel Pharmaceutical, Growel House, SB-187, Shastri nagar, Ghaziabad -201002 or Factory at D-7, M.G. Road, U.P.S.I.D.C Ind. Ave, Phase 1, Ghaziabad, Uttar Pradesh,

India Tel:+91-9999061772 or +91-9891259990 Email: info@growelpharma.com Website: http://growelpharma.com/tonexsyrup.html

Ingredients: Vanda roxburghii

Product name: Unilayaa Baby Massage Oil

Marketer: Unique Herbo Care Nagercoil Website: http://www.uniqueherbals.net/index.php?route=common/home

Ingredients: Tinospora cordifolia, Withania somnifera, Asparagus racemosus, Sida cordifolia, Pterocarpus marsopium, Ricinus comminis, **Vanda roxburghii**, Emblica officinalis, Rubia cordifolia, Seasme Oil

Product name: Gynocol Syrup

Marketers: Growel Pharmaceutical, Growel House, SB-187, Shastri nagar, Ghaziabad - 201002 or Factory at D-7, M.G. Road, U.P.S.I.D.C Ind. Ave, Phase 1, Ghaziabad, Uttar Pradesh, India Tel:+91-9999061772 or +91-9891259990 Email: info@growelpharma.com Website: http://growelpharma.com/tonexsyrup.html

Ingredients: Vanda roxburghii

Product name: Tonex Syrup

Marketers: Pelican Pharmachem, B/227, Shanti Commercial Centre, Nagar Sheths Vando, Ghee Kanta Road, Ahmedabad - 380 061, India Tel: +91 79 25508221 info@pelicanpharmachem.com or tatsatv@yahoo.com Website: www.pelicanpharmachem.com

Ingredients: Vanda roxburghii


Product Name : Tonex Capsule & Syrup

Composition : Each capsule contains :

Myristica Fragrans	20 mg.
Cinnamomum zeylanicum	15 mg.
Asparagus racemosus	10 mg.
Zingiber officinale	10 mg.
Piper longum	15 mg.
Pistacia lentiscus	10 mg.
Asparagus adscendens	10 mg.
Elettaria cardamomum	10 mg.
Tribulus terrestris	10 mg.
Crocus sativus	4 mg.

Each 5 ml. contains

Withania somnifera	35 mg.
Asparagus racemosus	20 mg.
Anacyclus pyrethrum	20 mg.
Pueraria Tuberosa	20 mg.
Mucuna pruriens	20 mg.
Rubia cordifolia	15 mg.
Clerodendrum	15 mg.
Tribulus	10 mg.
Vanda roxburghii	10 mg.
Trifolium	10 mg.
Asparagus adscendens	10 mg.
Santalum album	10 mg.
Flavoured syrup base	q.s.

Product name: Muscle Flex Gel

Marketer: Emmessar Biotech & Nutrition Ltd (EBNL), 29, Kamer Building, 38, Cawasji Patel Street, Fort, Mumbai - 400001, Maharashtra, India Tel: +91-22-6635 6209 +91-22-6637 0190 Website: https://www.ebnl.org/

Ingredients: **Rasna leaf (Vanda roxburghii**), Lavang fruit (Caryophyllus aromaticus), Kaiphal fruit (Myristica nagi), Jaiphal fruit (Myristica fragrans), Amba Haldi root (Curcuma Aromatica), Saunth rhizome (Zingiber officinalis), Tejpatra leaf (Cinnamomum Iners), Bala Beej seed (Sida cordifolia), Ashwagandha root (Withania somnifera), Malkangini seed (Celastrus paniculata), Mustard Oil (Brassica juncea), Wintergreen Oil (Gaultheria Oil), Menthol Oil (Mentha piperita), Turpentine Oil (Pinus longifolia), Ajwain Oil (Carum copticum), Nilgiri Oil (Eucalyptus oil), Capsicum Oil (Capsicum annuum), Kapoor Oil (Camphora) and Gel Base.

Product name: Masanumas 4

Marketer: Vatsal Ayuverdic Products (p) Ltd, 5, Bhaktisiddhant Apartment, Vrindavan Colony, Gen. Vaidya Nagar, Dwarka, Nashik – 422011 Tel: +91- 253 – 6545996 Email: info@vappl.com Website: http://www.vappl.com/index.htm

Ingredients: Dhamasa Extract (Arhagi camelorum), **Rasna Extract (Vanda roxburghii**), Sariva Extract (Hemidesmus indicus), Manjishtha Extract (Rubia cordifolia), Yashtimadhu Extract (Gycyrhiza glabra)

Product Name: Baidyanath Balarishta

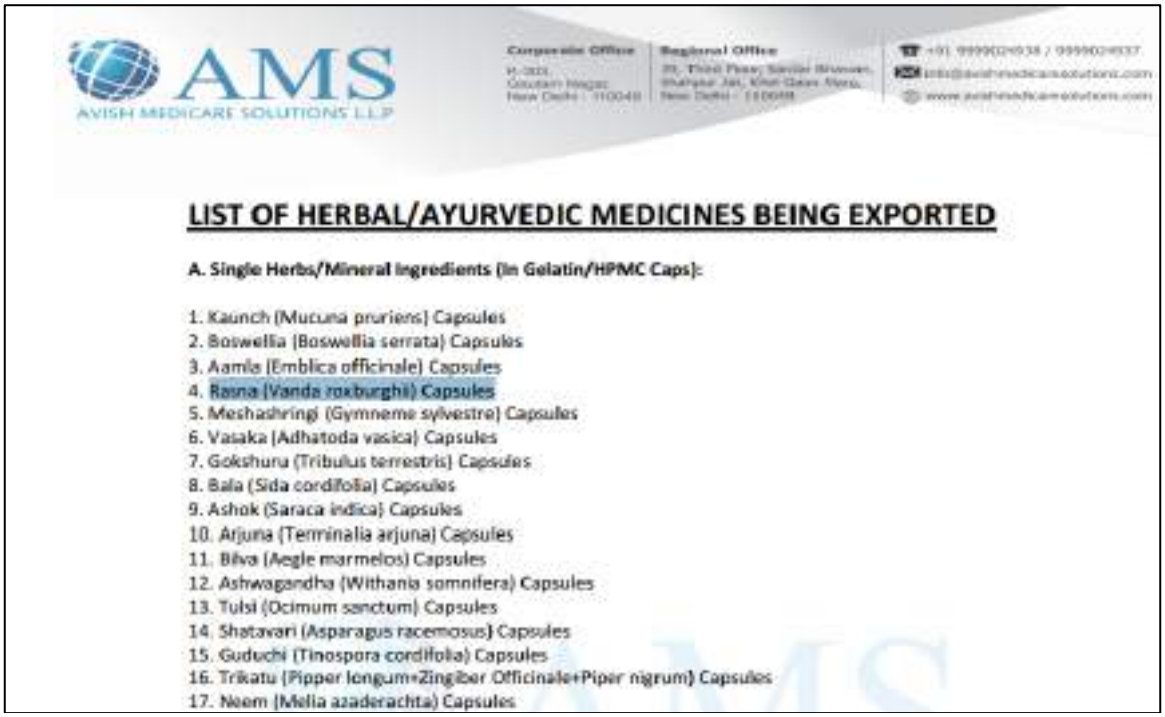
Marketer: Ayur Vidya, Kabutar Khana, Near Dadar Station Dadar East, Mumbai - 400014, Maharashtra, India Tel: +91-7304294681

Ingredients: SIDA CORDIFOLIA, WITHANIA SOMNIFERA, **Rasna** (**VANDA ROXBURGHII)**, SYZYGIUM AROMATICUM, TTIBULUS TERRESTRIS, WOODFORDIA FRUCTICOSA

Product name: Tanvi Herbal Vatshaanti

Marketer: Sarvodaya Ayurved Aushadhi Bhanda, Patel Building, Near Phatak Road Jogeshwari West, Mumbai - 400102, Maharashtra, India Tel: +91-8048076163

Ingredients: Vanda Roxburghii, Tribulus Terrestris, Ricinus communis, Cedrus Deodara, Boerhaavia Diffusa, Tinospora Cordifolia, Bahava, Zingiber Officinalls, Excipients Herbs



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LIST OF HERBAL/AYURVEDIC MEDICINES BEING EXPORTED

A. Single Herbs/Mineral Ingredients (In Gelatin/HPMC Caps):

1. Kaunch (Mucuna pruriens) Capsules
2. Boswellia (Boswellia serrata) Capsules
3. Aamla (Emblica officinale) Capsules
4. Rasna (Vanda roxburghii) Capsules
5. Meshashringi (Gymnema sylvestre) Capsules
6. Vasaka (Adhatoda vasica) Capsules
7. Gokshura (Tribulus terrestris) Capsules
8. Bala (Sida cordifolia) Capsules
9. Ashok (Saraca indica) Capsules
10. Arjuna (Terminalia arjuna) Capsules
11. Bilva (Aegle marmelos) Capsules
12. Ashwagandha (Withania somnifera) Capsules
13. Tulsi (Ocimum sanctum) Capsules
14. Shatavari (Asparagus racemosus) Capsules
15. Guduchi (Tinospora cordifolia) Capsules
16. Trikatu (Pipper longum+Zingiber Officinale+Piper nigrum) Capsules
17. Neem (Melia azaderachta) Capsules

Product Name: Rasna Capsules

Marketer: Avish Medical Solutions LLP, K-303 Gaulam Nagar, New Delhi – 110049 Tel:+91-9999024938 Website: http://avishmedicaresolutions.com/

Ingredients: Vanda roxburghii

Product Name: Rumoxil Capsules and oil

Marketer: Ayurved Research Foundation, Website: http://www.ayurvedresearchfoundation.com/

Ingredients:

Rasna (Vanda Roxburghii), Chopchini (Smilax China), Suranjan (Colchicum Inteum Baker), Nag Bhasma (Plumbum), Sonth (Zingiber Offidnale), Kesar (Saffron), Rigni (Solanum Xanthocarpum), Swaran Bang (Swaran Bang), Long (Caryophyllus Aromaticus), Jaiphal (Myristica Fragrans), Guggul (Balsamodendron Mukul), Karil (Capparis Aphylla), Lohban (Benzoinum), Baburia (Matricaria chamomilla), Ashwagandha (Withania Somnifera), Nirgundi (Vitex Negundo), Nagkesar (Mesua Ferrea), Piplamool (Piper Longum), Samudra Shokha (Argyreia Speciosa), Asthisanhar (Vitis Quadrangularis), Harad (Terminalia Chebula)

Product Name: Rumatone Gold Capsules

Marketer: Natural Health Supplements, Website: http://www.naturalhealth-supplements.com/

Ingredients:

Rumatone Gold capsules are very effective in treating rheumatic disorder. Rumatone Gold capsules contains natural herbs including Pipal (Ficus Religiosa), Sonth (Zingiber Officinale), Rasna (Vanda Roxburghii), Kalonji (Nigella Sativa), Suranjan (Colchicum Inteum Baker), Chopchini (Smilax China), etc. Rasna herb is known for suppressing aggravated vata, which is primarily responsible for causing pain. Sonth is useful in treating indigestion and destroying toxins in the body. Likewise other herbs are also used for centuries in treatment of pain and inflammation. These excellent ingredients of Rumatone Gold capsules make it a superb natural and safe remedy for rheumatism.

Product Name: Mahaved Orthonil Capsules

Marketer: Muscle Mantra, SCO 413-414 Chandigarh, CH 160035 India. Website: http://www.musclemantra.com/

Ingredients: Kesar (Crocus Sativus/Saffron) 150mcg. Sonth (Zingiber Officinale) 15mg., Lohban (Benzoinum) 12mg. Punarnava (Boerhaavia Diffusa) 25mg., **Rasna (Vanda roxburghii) 30mg**. , Suranjan (Colchicum Inteum Baker) 30mg., Abhrak Bhasma (Mica) 15.85mg. Bang Bhasma (Stanium Oxide/Stallum) 7mg., Ashwagandha (Withania Somnifera) 25mg.Giloy (Tinospora Cordifolia) 16mg.
Nirgundi (Vitax Negundo) 18mg.Harar (Terminalia Chebula) 18mg., Kantkari (Solanum Xanthocarpum) 5mg.Pipalamool (Piper Longum) 15mg.,Nisot (Operculina Terpethum) 25mg.Chobchini (Smilax China/S. Clabra) 12mg., Nag Bhasma (Plumbum) 65mg.Nagarmotha (Cyperus Rotundus) 25mg., Amla (Emblica Officinale)16mg.Base Q.S.
Ras Sindur 5mg.

Product Name: Auromere Ayurvedic Massage Oil
Marketer: Lori's Earth Friendly Products, 518 S. 1st Ave. Highland Park, NJ 08904, USA Tel:+732-221-8749 Website: https://tinyurl.com/zjhd8nd and http://www.earth-friendly.com/

Ingredients: Sesame Oil, Asparagus racemosus, Sweet Flag (extract), Round Zedory, Desmodium gangeticum (extract), Indian Beech, Castor Oil, Solanum xanthocarpum, Indian Nightshade, Uraria lagopoids, Sweet Flag (crushed), Deodar Pine, Spreading Hogweed, Fennel, Sandalwood Oil, Eaglewood, Yellow Lichen, Indian Valerian, Costus, Cardamom, Musk Root, Desmodium gangeticum (crushed), Country Mallow, Winter Cherry, **Vanda roxburghii**, Rock Salt.

Product Name: Dabur Kantakari Avaleha

Marketer: Dabur India Ltd, 8/3, Asaf Ali Road, New Delhi-110002, India Tel:+ 0120-3962100 Website: http://www.dabur.com/

Ingredients: Kantakari (Solanum surattense), Guduci (Tinospora cordifolia) , Cavya (Piper chaba)
Citraka (Plumbago zeylanica), Musta (Cyperus rotundus) , Karkatasrrigi Sunthi (Zingiber officinale)
Marica (Piper nigrum), Pippali (Piper longum) , Dhanvayasaka (Fagonia Arabica) , Bharrigi (Clerodendrum serratum) , **Rasna (Vanda roxburghii**) , Sathi (Hedychium spicatum) , Sarkara (Sugar)
Ghrta (Clarified butter from cow's milk) , Taila (Oil) , Madhu (Honey) , Tvagaksiri

Product name: Family Tonic Syrup

Marketer: Dwarkesh Pharmaceutical Pvt. Ltd. Plot 4801/5 Phase – 4, Behind Indogerman Tools GIDC Vatva, Pin code 382445, Gujarat, India. Tel: +91 9974974596 Email: info@dwarkeshpharma.com Website: www.dwarkeshpharma.com
Ingredients: Ashwagandha (Withiania Somnifera), Bhringraj (Eclipta Alba), Brahmi (Centrlla Asiatica), Vidang (Embellia Ribes), Gokharu (Tribulus Terrestrist), Gulab Phool (Rosa Centifolia), Satavari (Asparegus Racemosus), Jaiphal (Myristica Fragrance), Akkalkaro (Anacyclus Pyrentrum), Kaucha Beej (Mucuna Prurita), Amla (Enembellica Officinali),

Ghavandi Phool (Woodforida Fruticosa), Trikatu (Classical Formulations), Majith (Rubia Cardifolia), Loha Bhasma, Chaturjat (Classical Formulations) & **Rasna (Vanda Roxburghii)**

Product Name: Saheli Syrup

Marketer: PRM & Company 8-9-10-11, City Centre Complex,, Kalanala, Bhavnagar, Gujarat 364001, India. Tel:+91 278 244 8087 Email: info@prm-herbal.com Website: www.prm-herbal.com

Ingredients: Ashok Chhal (Saraca Indica), Lodhara Chhal (Symplicosa Racemosa), Shatavari Mool(Asperagus Racemosus), Kumari Leave Pulp (Aloe Barbadensis), Manjistha Mool (rubia cordifolia), Anatmool (Hemidesmus Indicus), Chandana Hardwood (Sanatalum Album), Punarnava Mool (Boerhaavia Diffusa), Nagkeshar Fruit (Mesue Ferrea), Arjun Chhal (Terminalia Arjuna), Amalaki Fruit (Embelica Officinlis), Zeher Mohra Bhasma, Beal Phal (Aegle Marmelos), Babul Sal (Acacia Arabica), Nagarmoth Rhizome (Cyperus Scariousus), Tagar Root (Valeriana Vallichi) 50 MG, **Rasana Panchang (Vanda Roxburghii)**, Narikela Fruit (Cocas Nusifera)

Trade

CITES trade statistics derived from the CITES Trade Database for the period 2005-2015 were analysed using the search term *Vanda tessellata*. The Database contains two records for *Vanda tessellata*: *V. tessellata* (*V. roxburghii*) and *V. tessellata* (*V. tesselloides*). The majority of finished products found in trade that contained *V. tessellata* associated the name “Rasna” with it.

NOTE: no information was identified on the artificial propagation of *V. tessellata*, other than for the horticultural live plant trade.

Trade issues to consider

- There is no specific HS tariff code (WCO) for this species or “Rasna”, the medicinal product. There are a number of different HS codes (WCO) that traders may use for “Rasna”:

Table 3 – HS commodity codes (WCO) for "Rasna" products

HS Code	Commodity code Chapter headings and descriptions
1211 1211.908690	Plants and parts of plants (including seeds and fruits), of a kind used primarily in perfumery, in pharmacy or for insecticidal, fungicidal or similar purposes, fresh, chilled, frozen or dried, whether or not cut, crushed or powdered Other
3003/3004 30049011 30049012	Herbal medicinal preparations India - HS Codes Classification of Ayurvedic System All Unani products

- **Classification of medicinal products** – as many "Rasna" products containing *Vanda tessellata* are sold as herbal medicinal products, these products are covered by legislation regulating their use and import, which can differ from country to country. Traders may attempt to classify the product as a non-licensable foodstuff rather than a licensable medicinal drug to avoid detection and legislative requirements.
- **Labelling requirements** – most legislation applicable to herbal medicines requires clear labelling of the ingredients with at least the common name of each botanical ingredient. In India, the Drugs and Cosmetics Act, 1940 is applicable to all Ayurvedic products. Under this Act, the label on the containers should comply with the requirements specified in this Act (part 50, 161) and display, amongst other information, an ingredient list and the drug quantity in metric units. However, a survey of the Ayurvedic market in India highlighted the fact that the majority of labels do not fulfil these requirements (Bhalerao *et al*., 2010). This was substantiated during research for this report, as many Ayurvedic products have long ingredient lists when researched on the Internet, etc., but upon examination of the actual packaging, these lists are often shortened, species are not declared, and detection of species, such as *Vanda tessellata*, in trade is hampered.

Live Plants

For the period 2005-2016, there are discrepancies between the amount reported by exporters (2,936 plants) compared to that reported by importers (1,616 plants). The main exporter of

over half the volume of live plants in trade is India followed by Thailand. The main importers of live plants are the US (includes Puerto Rico), Germany, Japan, Singapore and Switzerland.

Tissue cultures

One export in 2015 from Thailand to France of two artificially propagated cultures.

Raw Material

Flowers

One export in 2012 of 50 artificially propagated flowers from Sri Lanka to Germany.

Processed material

Derivatives

Table 4 shows the trade in derivatives. India is the sole exporter and all exports are of artificially propagated material, apart from three exports where source code "I" for confiscated or seized specimens was used. Guidelines for the preparation and submission of CITES annual reports (January 2017) states that source code "I" can be used for "*specimens that were seized or confiscated in a previous shipment, that are now being legally trade for legitimate purposes such as the return of confiscated specimens or a forensic analysis to be done in the importing country, etc. In these cases, source code "I" should be used and these records should be included within the annual report. These instances of subsequent legal trade in previously seized/confiscated specimens should not be confused with the reporting of illegal trade, which is a separate reporting requirement*".

The major importers are Malaysia, Mongolia, Oman and the United Arab Emirates Where the quantity of unit is not provided Latvia and Poland are major importers.

Table 4 – Trade in derivatives of *Vanda tessellata*

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2009	LV	IN		3567		derivatives			I
2010	PL	IN	XX	60		derivatives	g		I
2010	PL	IN	XX	180		derivatives			I
2013	AE	IN			1.89	derivatives	kg	T	A
2013	BH	IN			0.08	derivatives	kg	T	A
2013	KW	IN			0.26	derivatives	kg	T	A
2013	MN	IN			20.52	derivatives	kg	T	A
2013	MY	IN			43.299	derivatives	kg	T	A

2013	OM	IN			15.59	derivatives	kg	T	A
2013	ZA	IN			1.38	derivatives	kg	T	A
2014	AE	IN			2.32	derivatives	kg	T	A
2014	MY	IN			0.13	derivatives	kg	T	
2014	SG	IN			0.015	derivatives	kg	T	A

Dried plants

There is one reported export from Sri Lanka to the UK in 2013 of 50 artificially propagated dried plants.

Extracts

Table 5 shows that India is the sole exporter of extracts: 85.84kg of extract and one export of 997 extracts. All extracts are from an artificially propagated source. Malaysia appears to be the major importer followed by Oman, Mongolia and Latvia.

Table 5 – the trade in extracts of *Vanda tessellata*

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2012	AE	IN			0.84	extract	kg	T	A
2012	BH	IN			0.08	extract	kg	T	A
2012	KW	IN			0.42	extract	kg	T	A
2012	MN	IN			15.52	extract	kg	T	A
2012	MU	IN			0.651	extract	kg	T	A
2012	MY	IN			45.096	extract	kg	T	A
2012	MY	IN			997	extract		T	A
2012	OM	IN			16.51	extract	kg	T	A
2012	SG	IN			0.05	extract	kg	T	A
2012	ZA	IN			0.73	extract	kg	T	A
2013	AE	IN			0.3	extract	kg	T	A
2014	LV	IN			4.72	extract	kg	T	A

2014	MN	IN			0.28	extract	kg	T	A
2014	OM	IN			0.65	extract	kg	T	A

Medicines

Table 6 shows the only recorded exports of medicines were in 2015. All exports were from India to Oman and Singapore.

Table 6 – trade in medicines of *Vanda tessellata*

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2015	OM	IN			2.63	medicine	kg	T	D
2015	SG	IN			0.56	medicine	kg	T	A

Unspecified

Table 7 shows the trade in artificially propagated "unspecified" parts and derivatives. The only exporter is India, the trade commenced in 2015 and no quantity of unit is provided. The US, Germany and South Africa are the only importers.

Table 7 – trade in unspecified parts and derivatives of *Vanda tessellata*

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2015	DE	IN			55	unspecified		T	A
2015	US	IN			103	unspecified		T	A
2015	ZA	IN			10	unspecified		T	A

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Case Study of Papilionanthe teres (Vanda teres)

Commissioned by

Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

2016

Catherine Rutherford and Madeleine Groves

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Executive Summary

Papilionanthe teres, also known by its synonym *Vanda teres*, is an epiphytic orchid found in Bangladesh, Bhutan, India, Lao People's Democratic Republic, Myanmar, Nepal, PR China, Thailand and Viet Nam. It has not yet been assessed for the IUCN Red List and there is a lack of up-to-date field studies and conservation assessments on the status of this species. However, it is generally considered to be vulnerable throughout its range due to habitat loss and the high levels of illegal orchid trade in range States, such as Lao PDR and Myanmar, for local and regional (PR China and Viet Nam) horticultural and medicinal markets. This species is documented as having medicinal properties and is used at a local level; it is also in the horticultural trade but no finished medicinal products were found containing this species and no nurseries were identified growing this species to supply the medicinal market. This species is in *ex situ* conservation in botanic gardens.

While *P. teres* is in cultivation worldwide, in particular in SE Asia, it is its hybrids that are preferred in trade and are in wider cultivation for the live plant and cut flower industries. This species is also traded in the form of extracts used as cosmetic ingredients in finished cosmetic products. The extracts can be manufactured from most parts of the plant, including the stems. This report did not identify any nurseries cultivating this species specifically for extraction purposes and, at present, extracts from this species are found in a very limited number of cosmetic finished products but they are in worldwide trade. From extensive outreach to the cosmetic industry, and supported by analysis of CITES trade data, it appears that the trade flow from raw material to finished cosmetic product for this species can entail unprocessed and processed material (dried plants, stems) exported from artificially propagated sources in Thailand. This material then goes through an extraction process, often carried out by companies based in Europe that specialise in creating botanical extracts. While extraction companies were identified in range States, none were found to sell extracts of *P. teres*, although they may offer bespoke botanical extractions on application. These extracts are then sold to cosmetic and personal care product manufacturers, often based in Europe, and distributed and sold worldwide.

The CITES Trade Database records low volumes of this species in trade, all from artificially propagated sources, between a similar group of CITES Parties as those identified for other orchids used in the cosmetic trade. The trade in live plants over the last 10 years amounts to no more than 6,000 live plants and the trade in parts and derivatives is equally low in volume and comparatively new, commencing around 2010-2011. The major exporter for all this material is Thailand and France is the major importer, apart from live plants. France is also the major re-exporter of extracts and derivatives (i.e. finished products).

Finished products purporting to contain this species are traded globally and are regulated under CITES, but from analysis of trade data it is unlikely that the full trade in these products is documented or legal. This may be due to the misinterpretation or lack of knowledge of CITES among industry, deliberate circumvention of CITES regulations, poor knowledge of

orchid extracts in cosmetics by CITES and enforcement authorities and the burden placed on Parties and industry to comply with CITES implementation given the large quantities of commodities in trade. This situation is similar to other species on which CITES and industry have collaborated, including candelilla wax (*Euphorbia antisyphilitca*) and to some extent *Aniba* and *Bulnesia*. Further collaboration between CITES and the cosmetic and personal care product industry and its trade associations should continue to ensure a complete picture of this species' conservation status and its use by this industry is available. This can then be used to explore any amendments of the annotation to the Appendix II listing for orchids to exempt finished products that include certain orchid species or genera.

Taxonomy

Accepted name

Papilionanthe teres (Roxb.) Schltr. is an accepted name (WCSPF, 2017)

Synonyms

World Checklist of Selected Plant Families (WCSPF, 2017) lists *Vanda teres* (Roxb.) Lindl. and *Dendrobium teres* Roxb. * as synonyms of *Papilionanthe teres* (Roxb.) Schltr.

*Basionym/ Replaced synonym

CITES Orchid Checklist, Volume 3 (Roberts *et al*., 2001) lists *Vanda teres* (Roxb.) Lindl. as a synonym.

UNEP/Species + (2017) lists *Vanda teres* and *Aerides subulata* (J.Koenig) Schltr. as synonyms.

eMonocot (2017) lists the following synonyms: *Vanda teres* (Roxb.) Lindl.: *Dendrobium teres* Roxb., *Papilionanthe teres* f. *candida* (Rchb.f.) Christenson, *Vanda teres* (Roxb.) Lindl., *Vanda teres* var. *candida* Rchb.f.

efloraofindia (2017) lists the following synonyms
Dendrobium teres Roxb., *Papilionanthe teres* f. *candida* (Rchb.f.)
Christenson, *Vanda teres* (Roxb.) Lindl., *Vanda teres* var. *candida* Rchb.f.,

Common names

Table 1 – Common / vernacular names for *Papilionanthe teres* (syn.: *Vanda teres*)

Language	Common/vernacular name
Chinese	feng die lang 棒叶万带兰 Banghua Lan (stick flower orchid), Jianyewandai Lan (sharp leaved ten-thousand-generation / Vanda orchid), bangyewandai Lan (terete leaf Vanda orchid), Bangyeyu Lan (terete leaf jade orchid) and Fengdie lan *Vanda* genus name 万代兰 (属)

	Vanda teres 凤蝶兰
English	The Terete Leaf Papilionanthe, Cylindrical-leaved vanda, Terete leaf papilionanthe, Terete vanda, Cylindrical orchid, Parrot flower, Pencil orchid
French	Vanda à feuilles cylindriques, Vanda à fleurs roses.
Indian - Manipuri	Chaitek Lei
Indonesian	Anggerik pensil, Potloodorchidee (Belgium)
Myanmar	Sagalay-pan, Yoset-gyi
Nepal	Harjor (Gurung), Thurjo (Nepali)
Thai	เอื้องโมก Euang mohk, Euang mohk gor / เอื้องโมกกุหลาบ Euang mohk gu laap / แวนด้าใบกลม Wan da bai glom, Ueang kean
Vietnamese	Cành giao; Vân lan; Hồ điệp; Vân đa cành giao; Lan mành mành

Industry names

Vanda teres stem extract, *Vanda teres* root extract. No INCI names are found for these extracts, but they are mentioned in patents describing the manufacture and use of extracts from this species (US Patent, 2008).

Identification

Vanda species can vary considerably in the size, shape and colour of their flowers. In the past, identification of *Vanda* from other orchid genera would have taken leaf shape into consideration as this genus fell into two leaf types - terete and strap. However, due to recent taxonomic revisions of *Vanda* and the inclusion of a number of other genera, dependence on leaf shape alone for identification is now problematic (D. Roberts, pers. comm. to M. Groves, 2017; A. Shuiteman, pers. comm. to M. Groves, 2017).

Distribution

This epiphytic orchid is found in primary and secondary evergreen broad-leaved forests on rocky crystalline marble-like rocky limestone at elevations 900-1,200 m. The distribution of this species differs depending on the source consulted. UNEP-WCMC SPECIES+ database includes India, Lao People's Democratic Republic, Myanmar, and Thailand as range States (UNEP, 2017).

This report follows *The Flora of China* (2017) which cites the following countries (additional citations are provided in brackets): Bangladesh (Sinha and Roy, 2004), southern Bhutan (P. Cribb, pers. comm. to M. Groves, 2017), India, Lao PDR, Myanmar, Nepal (WCSPF, 2017), southern Yunnan Province, PR China (Flora of China, 2017; WCSPF, 2017), Thailand, and Viet Nam (WCSPF, 2017). This species is also found in the North and South Andaman Islands

(Karthigeyan *et al*., 2014) and in Nepal it is found in the eastern and central areas at 200-2,100m as an epiphyte on *Mitragyne parviflora*, *Eugenia formosa* and *Shorea robusta* trees (Ghimire, 2008).

Fig 1. – Distribution Map for *Papilionanthe teres* (*Vanda teres*)

Source- eMonocot http://e-monocot.org/taxon/urn:kew.org:wcs:taxon:147347

Fig 2. – Distribution Map for *Papilionanthe teres* (*Vanda teres*) in India

Source – Ved *et al*., 2017

Legal / conservation status

This species has not yet been assessed for the IUCN Red List (IUCN Red List, 2017).

Bangladesh – this species is considered horticulturally important, vulnerable due to indiscriminate collection and is among the species listed in the Red List of Vascular Plants of the Rema-Kalenga Wildlife Sanctuary.

Bhutan - No information was identified on the status of this species in Bhutan

India – Common in inland evergreen forests in the North and South Andaman Islands (Karthigeyan *et al*., 2014). Considered rare, threatened and endangered in Sikkim, India (Lucksom, 2005)

Lao PDR – National-level conservation assessments are absent for orchids in general in Lao PDR (Phelps, 2015). This species is included in *ex-situ* conservation efforts (Information A, pers. comm. to M. Groves, 2017).

Myanmar – No information was identified on the status of this species in Myanmar. National-level conservation assessments are absent for orchids in general in Myanmar (Phelps, 2015).

Nepal - This species is cited as a threatened medicinal orchid (Orchid Conservation News, 2015)

PR China – This species was cited as Critical on the China Species Red List because only a single location was known. It has since been re-evaluated to Vulnerable because it was found to be common in karst regions in Xishuangbanna (Liu *et al*., 2015).

Thailand - No information was identified on the status of this species in Thailand.

Viet Nam - This species is considered rare and endangered in the wild in Vietnam, widely collected as an ornamental plant and in need of protection (Averyanov and Averyanova, 2003)**.**

This species was listed in CITES under the family Orchidaceae Appendix-II listing in 1975 (UNEP, 2017). Applicable national legislation regulating the collection and use of this species in outlined in Table 2. This Table also outlines the CITES classification of each country under the CITES National Legislation Project (NLP) showing the status of national legislation implementing CITES.

Table 2 – National and international legislation applicable to *Papilionanthe teres* (*Vanda teres*)

Country	Legislation
Bangladesh	Wild plants including orchids fall under the Wildlife (Conservation and Security) Act, 2012 – formerly Wildlife Protection Act, 1974. It provides conservation and safety of wildlife, forests and biodiversity by repealing the existing law relating to conservation and management of wildlife ensuring the protection of wild plants https://www.google.co.uk/?gws_rd=ssl#q=Bangladesh+flora+law+report+&*. Bangladesh is listed under Category 2 of the CITES NLP.
Bhutan	There are no specific acts or regulations applicable to this species. However, collection of plants in general and suitable habitat for this species is afforded protection under the Forest and Nature Conservation Act (1995 – *Papilionanthe teres* is not listed in Schedule 1 of this Act), Forest and Nature Conservation Rules (2006) and National Forest Policy. Collection of plants may require permits depending on the type of forest or land where collected (e.g. Government versus private forests). Bhutan is listed under Category 3 of the CITES NLP.
PR China	Wildlife legislation is built around the 1988 Wildlife Protection Law. The 2006 Regulation on Administration of Import and Export of Endangered Wild Animals and Plants is aimed specifically at the protection of CITES-listed species, as well as species under special state protection and the 1992 Regulations for the protection of terrestrial wildlife which implement the Wildlife Protection Law, and address species which are precious, endangered, beneficial or of important economic and scientific research value (terrestrial wildlife regulations, Art. 2). The State Forestry Administration, which lies directly under the State Council, is responsible for the nationwide management of terrestrial wildlife (Wildlife Protection Law, art. 7). China (including Hong Kong SAR)

	is listed under Category 1 of the CITES NLP.
India	No legislation applicable specifically to this species was found. It is not listed under Schedule VI of The Wildlife Protection Act, 1972 which affords higher levels of protection to plant species and criteria for their export. Habitat and use of this species found within them falls under the following acts: The Scheduled Tribe and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 allows for the right to access, use or dispose of minor forest produce for designated tribes; The Indian Forest Act, 1927; and The Forest Conservation Act, 1980. Exports of wild-taken specimens for commercial purposes, with the exception of cultivated varieties of plant species included in Appendices I and II is prohibited (Notification No. 2 (RE-98)/1997-2002 dated the 13th April, 1998) (UNEP, 2017). India is listed under Category 2 of the CITES NLP.
Lao People's Democratic Republic	Restrictions limit the harvest of forest products (including orchids) to production forests with sustainable management plans (Lao Forestry Law No.6/NA), although there is also no available evidence that these plans have been developed. Legality of orchid harvesting and trading is framed by national law through The National Forestry Law (24 December 2007) N°6/NA, Wildlife Law (24 Dec 2007- N°7/NA) and the NBCA Law (PM Decree No 164/1993) and Environment Law 2007(Articles 9-12) and Environmental Protection Law No 02-99/NA. Provincial Governor decrees on the banishment of collection and transportation of wild orchids are also in place. The export of wild and/or semi-cultivated orchids, in any form or otherwise semi-processed, is now illegal in Lao PDR unless CITES permits are obtained. No quotas are permitted for wild orchid trade in every province within Laos and collection or transportation is considered illegal. Lao PDR is listed under Category 3 of the CITES National Legislation Project (NLP). See document Doc.13 of the 67th meeting of the CITES Standing Committee https://www.iucn.org/sites/dev/files/import/downloads/piloting_cites_case_study_iucn_jul_09.pdf
Nepal	The Forest Act 1993, and Forest Regulations 2051 (1995) as amended by the Forest (Third Amendment) Rules, 2062 (2005), specifies all orchids in Nepal are protected under Schedule 3. However, the Government of Nepal published a notification on April 14th, 2008 permitting collection of wild orchids for trade (Subedi *et al*., 2013). Nepal is listed under Category 3 of the CITES NLP. New Constitution adopted in October 2015.
Myanmar	Since 1994 all wild orchids have been protected by national legislation under the Protection of Wildlife and Conservation of Natural/Protected Areas Law, 1994. A permit is required to harvest or sell all wild orchids. Myanmar is listed under Category 3 of the CITES NLP.
Thailand	Collection of wild orchids from the forest is prohibited, except for research, and is not allowed for trade. However, personal consumption is limited to 20 plants or less and there are additional bans, fines and prison terms associated with their harvest from protected areas (e.g., National Park Act B.E. 2504). The Plant Act (1992) was revised to comply with the CITES, promoting artificial propagation of CITES-listed orchids and to regulate international trade. This was echoed under a Notification of the Department of Agriculture who in 1998 declared that only artificially propagated orchid plants may be exported and all relevant nurseries be registered with the Thai CITES Management Authority for flora. Also relevant for habitat protection are the 1961 National Park Act and the 1964 Forest Reserve Act (see http://tinyurl.com/ze373bf). Thailand is listed under Category 1 of the CITES NLP.
Viet Nam	There is no specific legislation regarding this species, but the protection and sustainable use of wildlife falls under the Law on Forest Protection and Development (2004). Implementing regulation for the Forest Law is the Decree No. 32/2006/ND-CP on Management of Endangered, Precious and Rare Forest Plants and Animals. Although all wild harvested terrestrial animals are not granted a CITES export permit, wild harvested orchid species can be exported (see https://cites.org/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf). Viet Nam is listed under Category 1 of the CITES NLP.

Sources: CITES National Legislation Project (NLP) 2016 updates (see CoP17 Doc. 22, Annex 3 (Rev. 1), http://tinyurl.com/golt3ph; Phelps, 2015

Wild Harvesting

This species has been identified as of medicinal, horticultural and cosmetic importance. No specific references to this species being collected from the wild were identified. However, the illegal collection and trade in orchids for the medicinal and horticultural trade is documented in two of this species' range States, Lao PDR and Myanmar, and references the collection of specimens of the genera *Vanda* and *Papilionanthe* (IUCN, 2008; Phelps, 2015).

In northern Laos the majority of wild collected medicinal orchids are exported to PR China while villagers or individual collectors sell wild plants to local or foreign middlemen and commercial nurseries (IUCN, 2008). Market surveys carried out on the Thai-Myanmar border highlighted significant illegal, international trade in orchids in general from Myanmar to Thailand for domestic consumption. These surveys also identified major markets within Southeast Asia and a medicinal trade in dried orchids for Vietnamese and Chinese consumption (Phelps, 2015). This species is an important medicinal orchid collected and used by local healers in India (Pant, 2013).

Cultivation

The genus *Papilionanthe* was first described in 1915 when *Vanda teres* was renamed *Papilionanthe teres*. It requires full sun and can be found cultivated throughout SE Asia in nurseries both within (e.g. Lao PDR, PR China, Thailand) and outside (e.g. USA, Jamaica) of range States. This species is not cultivated on a mass commercial scale (M. Motes, pers. comm. to M. Groves, 2017; S. Wannakrairoj, pers. comm. to M. Groves, 2017) but is used in hybrid breeding and the hybrids are cultivated on a larger scale, both within and outside of range States. It is included as a parent in various well known hybrids such as Singapore's national flower, the *Vanda* Miss Joaquim "Agnes" (now known as *Papilionanthe* Miss Joaquim), which is cultivated for the cut flower industry throughout SE Asia and the production of the lei flower garlands of Hawaii.

This species is in tissue culture for *ex situ* conservation purposes (Orchid Conservation News, 2015). Botanic Garden Conservation International (2017) cites 11 *ex situ* conservation sites for *Vanda teres* and 21 for *Papilionanthe teres*.

Cultivation specifically for extraction purposes

This species has been cultivated using micropropagation techniques in order to screen for phytochemical properties (Mazumder *et al*., 2010) and its use as an ingredient in finished cosmetic and personal care products has been recognised. No nurseries were identified which cultivate this species specifically for production of extracts (Lao PDR, pers. comm. to M. Groves, 2017; S. Wannakrairoj, pers. comm. to M. Groves, 2017). Botanical extract companies in PR China can manufacture botanical extracts to order (Information B, pers. comm. to M. Groves, 2016). Only one example of the cultivation of this species for the cosmetic industry for research purposes and to possibly produce orchid extracts was identified (in PR China) - see *Vanda teres* entry in Brinckmann, 2014 and Box 1 below). From publicity material, it appears that hybrids as well as species are cultivated in the TianZi Nature Reserve (M. Motes pers. comm. to M. Groves, 2016; H. Perner pers. comm. to M. Groves, 2016).

Box 1 – LVMH 2015 Environmental Report

"...biodiversity is one of Guerlain's six CSR issues at stake; our strategy consists of creating sustainable industries for our favourite natural ingredients. That is why Guerlain decided to team up with several organisations and local stakeholders in a variety of programmes including:

- Orchids & Tianzi: a global commitment Guerlain has created a unique research centre for orchids called the 'Orchidarium', which has three hubs: a basic research laboratory in Strasbourg (France), an experimental garden in Geneva (Switzerland) and an exploratory reserve in Tianzi (Yunnan, China). In 2009, we signed a ten-year Sustainable Development philanthropy agreement with Minguo Li Margraf, Head of the Tianzi Centre. A partnership based on three flagship actions: - The regeneration and conservation of the ancient rainforest thus contributing to the development of the local economy, - **Introducing and cultivating all types of orchids above and beyond our own raw material requirements¬: 10,000 orchids have already been planted since 2009**, - Protecting the region's flora and fauna. Tianzi orchids were certified Organic by Ecocert in 2014.

- Short film on the Tianzi Reserve - https://www.guerlain.com/int/en-int/skincare/orchidee-imperiale

For several years, our service providers and suppliers have been made aware of our sustainable development approach: ..... In order to go further and formalise our commitment, we sent over 600 suppliers our "Responsible Procurement Charter" drafted by the LVMH Group's Perfumes & Cosmetics Branch in 2014. ..... All suppliers must complete a self-assessment in order to obtain a score. An analysis was conducted by the HA coordination unit of the Perfumes & Cosmetics branch to compare scores for suppliers in the same family, to define the best in class in each category, and to define individual action plans for each supplier so that they can continue to improve (LVMH's Supplier's Code of Conduct https://r.lvmh-static.com/uploads/2014/10/lvmh-suppliers-code-of-conduct.pdf) .

For example, we are the first Perfumes & Cosmetics House to have been awarded the "Biodiversity and Climate" label by the Ecocert organisation ..... Since 1828 and the House's first factory in Paris, Guerlain has always produced its products in France".

Source – LVMH 2015 Environmental Report http://tinyurl.com/zrvmwne LVMH is the parent company of Guerlain

Commercially traded forms

Raw material

Medicinal Use:

Medicinal plant references cite *Papilionanthe* species as used in traditional medicine in Malaysia and Nepal although this may be an application of Doctrine of Signatures (herbs resembling various parts of the body used by herbalists to treat ailments of those body parts - Teoh, 2016).

This species is utilized at a local level for medicinal, ornamental and religious purposes in India (De and Medhi, 2015). No evidence was found of the export of raw material or finished medicinal products containing this species.

Subedi *et al*. (2013) report that collection and trade of wild orchids in Nepal is widespread for domestic use and list *Papilionanthe teres* among the orchids reportedly used in traditional medicine and commercial trade in Nepal.

This species is also in trade for medicinal purposes under a number of different names (see Fig 3); however no medicinal finished products containing this species were identified in trade for this report.

Fig 3 – Non-scientific names for *Papilionanthe teres*

Source – Medicinal Plant Name Services Database https://tinyurl.com/jrpqoxu

- **Whole plant –** paste made from the plant is used to treat dislocated bones in Nepal (Teoh, 2016)
- **Stems –** used to improve blood flow and reduce swelling in TCM. A piece of stem is tied in loin of the body of tribal peoples to protect from cold and cough (Teoh, 2016).
- **Leaves –**used to improve blood flow and reduce swelling in TCM. In NE India leaf paste is applied to the forehead to reduce high fevers (Teoh, 2016).
- **Flowers** – decoctions of flowers along with the flowers of *Heteropanx fragrans* are used to treat general debilitation and applied as cooling agent to forehead (Quattrocchi, 2016). The flowers of *Papilionanthe teres* are used as an offering to Lord Buddha and spirits by the *Khamtis* and other *Tai* ethnics of Assam and Arunachal Pradesh (De L.C. and Medhi, 2015). People of Assam and Arunachal Pradesh also use *Rhynchostylis retusa, Papilionanthe teres, Vanda roxburghii, Aerides odoratum* and many *Dendrobium* orchid species in their cultural festivals (Medhi and Chakrabarti, 2009).

Processed forms

Fragrances

Many fragrances which cite *Vanda* orchids in their title or in the accompanying publicity material are probably reconstructions of the orchid fragrance and do not contain any orchids (R. Clery, pers. comm. to M. Groves, 2016; E. Covey, pers. comm. to M. Groves, 2017). In 1988 “Singapore Bliss” (signature scent of Singapore Airlines), was said to use *Vanda* Miss Joaquim as the main extract. The only fragrance found containing *Vanda* is called “Miss Udorn Sunshine”. This fragrance is produced from a hybrid that includes *Vanda* Josephine Van Brero (*Vanda teres* x *Vanda insigne*) and *Vanda denisoniana* and is available from numerous Internet sites including Amazon (Lanta Orchid Nursery, 2017; D. Sripotar, pers. comm. 2017). See overview of the Use of Orchids in the Fragrance Industry.

Extracts

Extracts identified in trade as ingredients in finished cosmetic products were *Vanda teres stem extract* (Brinckmann, 2014) and *Vanda teres root extract* (US Patent,

2008). This species is cited as containing derivatives isolated from its stems which are candidates as new natural ingredients for "anti-ageing" formulations (Teoh, 2016). Table 3 shows one company's source of material to produce extracts (Industry, pers. comm., 2016).

Table 3 - Source of *Papilionanthe teres* material for extraction purposes

ORCHID LATIN NAME	TYPE	COUNTRY OF ORIGIN	PROPAGATION	CULTIVATION	HARVESTER AND SUPPLIER	PART USED
Papilionanthe teres	Species	Thailand	Artificially propagated	Nursery	Raw material supplier	Stem

Method of extraction

Table 4 provides an example of the extraction process raw material, as outlined in Table 3, would go through to manufacture *Vanda Teres Stem Extract*. Patents taken out for the use of this species can be found in Annex 2).

Table 4 - *Papilionanthe teres* extract process

Extract type	Processing country	Supplier type	Extraction type	Physical form	Shelf life	Post transformation	INCI name
Extract	France	Small scale extraction firm	Butylene glycol	Liquid	12 months	No other process	Orchid extract

A general description of how botanical extracts are processed for use in cosmetic and personal care products is provided below. This is either used to make a claim of the plant being present, or to give a specific activity to a skincare product:

Any part of the plant, or a whole plant, can be used and the material is usually dried and immersed whole or crushed in a solvent (chemical, water, butylene glycol) with between 10-25 kg of plant material per 100kg of solvent. The solvent could be natural or synthetic, and oil or water soluble. The mixture is stirred and left to macerate for as long as necessary. If the extraction process requires a specific level of active chemicals in the solvent, this is monitored and the maceration is stopped once the correct level is achieved. The extract is then chilled and filtered to remove the plant material and produce, as far as possible, a clear extract, or the filtrate may be dried and crushed to produce a fine powder. Dependent again on the requirements, the extract may be decolourised (using activated charcoal) and/or preserved (water based extracts). This process is mostly considered to be chemical (by extracting the active chemicals into a solvent) and most of the extracts are liquid so they can easily be added to skincare liquid formulations (Alban Muller short film on extraction process, 2017; R. Borner, pers. comm. to M. Groves, 2016).

Manufacturers and selected finished products in trade

From research carried out for this report, and as stated in Brinckmann (2014), no marketers of this ingredient were found other than Guerlain / LVMH. At present, they appear to be the only cosmetic company growing and harvesting this ingredient in PR China for possible inclusion in its finished products and for research purposes.

Selected finished products in trade

Product name: Orchidée Impériale Eye and Lip Cream

Marketer: Guerlain SA, 125, rue du Président Wilson, 92593 Levallois Perret Cedex FRANCE http://www.guerlain.com/int/en-int/orchidee-imperiale-eye-and-lipcream

Ingredients: Brinckmann (2014) states "Although the botanical names of the ingredients are not disclosed the product is made with "gold orchid" and independent news articles report that this is an extract of *Dendrobium chrysotoxum*. Information received from BLV also lists the ingredients of this product to include *Dendrobium chrysotoxum*, *Phalaenopsis* 'Anubis', *Vanda coerulea*, and ***Vanda teres***".

Product Name: Miss Udorn Sunshine

Marketer: Lanta Orchid Nursery, Thailand http://www.lanta-orchidnursery/perfume_eng.htm

And Udorn Sunshine Fragrant Orchid Farm,127 Udon-Nongsamrong Road

Udorn Thani 41000 Thailand Tel: +66(0)42126475

Ingredients: extracts of ***Vanda* Josephine Van Brero (*Vanda teres* x *Vanda insigne*)** and ***Vanda denisoniana***

Trade

CITES trade statistics from the CITES Trade Database for the period 2005-2015 were analysed. All recorded trade was listed under "*Papilionanthe teres*" not "*Vanda teres*". Live plants of *Vanda* hybrids in a flowering or non-flowering state shipped according to annotation [10] under certain criteria and cut flowers of artificially propagated plants of all orchids (point b) annotation #4) are not regulated under CITES. Reporting of the trade in hybrids is only provided to the level of "*Vanda* hybrid" and does not include specific information on the ancestry / parentage of the hybrids. Live plants, stems, flowers, roots, leaves or cell lines from tissue cultured plants may all be used to produce orchid extracts. There are no known species-specific Harmonised System (HS) tariff codes that would enable tracking import / (re)export trade of this species. There are specific codes for live, raw, semi-processed or processed products of orchids or products likely to contain orchids (see Annex 3 for a list of HS codes per country per product). This species is in trade via the Internet and as seed.

Live plants

This species is in trade as artificially propagated live plants. Discrepancies exist between exporter reported amounts (5,882 plants) and importer reported amounts (2,596 plants). The main exporters are Thailand, India and Malaysia, and the main importers are the USA, Venezuela and Thailand.

Tissue cultured plants

The CITES Trade Database shows 30 cultures in total exported from Thailand to France in 2010 and 2013.

Raw material

Roots

The CITES Trade Database shows only one export of one artificially propagated root in 2008 from Cote D'Ivoire to Gabon.

Stems

The trade in this commodity (source given as artificially propagated) commenced in 2011. The only reported exporter is Thailand and the only reported importer is France. Discrepancies exist between exporter reported amounts (10kg) and importer reported amounts (119kg).

Processed material

Dried plants

The trade in dried plants is similar to that of stems. The material is all from artificially propagated sources and the only reported exporter is Thailand and the only reported importer is France. Discrepancies exist between exporter reported amounts (100.8kg) and importer reported amounts (35.8kg).

Table 5 – Trade in dried plants of *Papilionanthe teres* (2005-2016)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2008	FR	TH		25		dried plants	kg	T	A
2011	FR	TH		10		dried plants	kg	T	A
2012	FR	TH		800		dried plants	g	S	A
2012	FR	TH			25.8	dried plants	kg		A
2013	FR	TH			13	dried plants	kg		A
2014	FR	TH			25	dried plants	kg		A

Derivatives

The trade in derivatives is reported as re-exports of artificially propagated material solely from France (origin Thailand) to Japan, Turkey and Switzerland. This trade is relatively new, commencing in 2011. Analysis of the volumes in trade is problematic given the poor reporting of the units associated with quantity (e.g. ml, litres, kg etc). Problems are also caused by the definition of 'Derivative' provided in the CITES Glossary (*any processed part of an animal or plant e.g. medicine, perfume, watch strap*). While this shows that the commodity has been processed, the examples do not show whether this was the final stage of processing or whether the derivatives are in numerous, different forms (oils, creams, finished products).

Table 6 - Trade in derivatives of *Papilionanthe teres* (2005-2016)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2011	JP	FR	TH		9	derivatives		T	A
2012	JP	FR	TH		70.25713	derivatives		T	A
2013	JP	FR	TH		32.70095	derivatives		T	A
2013	TR	FR	TH		19.35667	derivatives		T	A
2014	CH	FR	TH		34.4619	derivatives		T	A
2014	JP	FR	TH		116.5976	derivatives		T	A
2014	TR	FR	TH		92.42429	derivatives		T	A
2015	CH	FR	TH		3.571429	derivatives		T	A
2015	JP	FR	TH	137.1313		derivatives	ml	T	A
2015	JP	FR	TH		34.55	derivatives		T	A
2015	TR	FR	TH		48.13333	derivatives		T	A

Extracts

The trade in extracts is all of artificially propagated material being re-exported by France (origin Thailand) to Japan, Switzerland and Turkey.

Table 7 - Trade in extracts of *Papilionanthe teres* (2005-2016)

Year	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2015	CH	FR	TH		5.1E-06	extract	kg	T	A
2015	CH	FR	TH		0.031478	extract	l	T	A
2015	JP	FR	TH		0.391073	extract	l	T	A
2015	TR	FR	TH		0.033311	extract	l	T	A

There is an export from India for 100 “unspecified” to Germany in 2015 and one re-export of one “specimen” (origin given as XX unknown) from France to the US in 2015.

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Case study of Cypripedium parviflorum var. pubescens (Cypripedium pubescens)

Commissioned by

Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

2016

Catherine Rutherford and Madeleine Groves

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Executive Summary

This case study examines the trade in finished products of *Cypripedium parviflorum* var. *pubescens* and the source of the raw material (wild collected or cultivated) used. It identifies the main importing / exporting countries and the forms in which it is traded (extract, roots, rhizomes, live plants). Nurseries and pharmaceutical, fragrance, flavour and cosmetic end users were contacted to investigate the trade in this species.

Cypripedium parviflorum var. *pubescens* is native to North America and is widespread in its region. Historically wild collected for both medicinal and ornamental use, this species was considered difficult to grow in cultivation and was subject to several conservation measures. Various trade recommendations for herbal use are in place to discourage wild collection. In recent years developments in artificial propagation have made it easy to cultivate *Cypripedium* species from seed and there are now several nurseries in the USA, Canada, Belgium, the Netherlands and Germany cultivating this genus, including *Cypripedium parviflorum* var. *pubescens*, in numbers apparently sufficient to supply the demand from both the horticultural and pharmaceutical markets.

Cypripedium parviflorum var. *pubescens* is advertised globally as Cypripedium pubescens extract and widely used in homeopathic medicine, in which there is often not even a molecular presence of the part or derivative of the plant species from which the remedy is derived due to the constant dilution of the potency. The main global manufacturers of this homeopathic remedy are Boiron, Homeodel, Herbamed and DHU. It is less widely used in the cosmetic industry and only four products were identified manufactured by three companies. Another US company, Active Organics, supply orchid extract globally. Little information was received from this industry but those that responded stated that the raw material used in their products came from cultivated specimens.

There is no unique HS customs code for this species and the only source of specific trade data comes from the CITES Trade Database. Small amounts (about 5,700) of live plants have been exported over a ten year period 2005-2015. The main exporters are Canada, Belgium, the Netherlands and Germany. The main exporter of derivatives is Belgium to the EU.

The market for this species is small and niche. The majority of products identified as being in international trade are homeopathic remedies for which the conservation risk to species in the wild could be seen as minimal. In recent years, the trade in derivatives has increased within Europe but it appears that cultivated specimens grown in specialist orchid nurseries are supplying this trade. There appears to be a small amount of wild collection in North America but this is not exported internationally.

Taxonomy

Accepted name

Cypripedium parviflorum var. *pubescens (*Willd.) Knight

The North American species *Cypripedium parviflorum* has three varieties: *Cypripedium parviflorum* var. *parviflorum, C. parviflorum* var. *makasin* and *C. parviflorum* var. *pubescens*. *Cypripedium parviflorum* var. *pubescens* is considered to be the commonest species in North America and is widely referred to in industry as *Cypripedium pubescens*.

Synonyms

World Checklist of Monocotyledons:

Homotypic synonyms: *Cypripedium pubescens* Willd., Hort. Berol. 1: 13 (1804);
C*ypripedium luteum* var. *pubescens* (Willd.) Raf., Med. Fl. 1: 142 (1828);
Cypripedium bulbosum var. *pubescens* (Willd.) Farw., Amer. Midl. Naturalist 10: 207 (1927);
Cypripedium calceolus var. *pubescens* (Willd.) Correll, Bot. Mus. Leafl. 7: 14 (1938);

Heterotypic synonyms: *Cypripedium flavescens* Redouté, Liliac. 1: t. 20 (1803);
C*ypripedium luteum* var. *angustifolium* Raf., Med. Fl. 1: 140 (1828);
Cypripedium luteum var. *biflorum* Raf., Med. Fl. 1: 140 (1828);
Cypripedium luteum var. *concolor* Raf., Med. Fl. 1: 140 (1828); *Cypripedium luteum* var. *glabrum* Raf., Med. Fl. 1: 140 (1828); *Cypripedium luteum* var. *grandiflorum* Raf., Med. Fl. 1: 140 (1828); *Cypripedium luteum* var. *maculatum* Raf., Med. Fl. 1: 140 (1828);
Cypripedium assurgens Raf., Herb. Raf.: 76 (1833); *Cypripedium aureum* Raf., Herb. Raf.: 76 (1833); *Cypripedium furcatum* Raf., Herb. Raf.: 76 (1833); *Cypripedium undatum* Raf., Herb. Raf.: 77 (1833); *Cypripedium vittatum* Raf., Herb. Raf. 2: 43 (1833), nom. illeg.;
Cypripedium vittatum var. *tortile* Raf., Herb. Raf. 2: 44 (1833).
Cypripedium veganum Cockerell & Barker, Proc. Biol. Soc. Washington 14: 178 (1900);
Cypripedium bulbosum var. *flavescens* (Redouté) Farw., Rep. (Annual) Michigan Acad. Sci. 15: 170 (1913); *Cypripedium parviflorum* var. *planipetalum* Fernald, Rhodora 28: 168 (1926); *Cypripedium planipetalum* (Fernald) F.J.A.Morris in F.J.A.Morris & E.H.Eames, Our Wild Orchids: 8, 11 (1929); *Cypripedium calceolus* var. *planipetalum* (Fernald) Vict. & J.Rousseau, Contr. Inst. Bot. Univ. Montréal 36: 68 (1940) ; *Cypripedium calceolus* f. *rupestre* Vict. & J.Rousseau, Contr. Inst. Bot. Univ. Montréal 36: 67 (1940) ;
Cypripedium parviflorum f. *planipetalum* (Fernald) P.J.Cribb, Hardy Cypripedium: 52 (2012).

Species +

Listed as *Cypripedium parviflorum* with synonyms *Cypripedium bifidum* Raf.*; Cypripedium luteum* Aiton ex Raf.; *Cypripedium pubescens* Willd.

CITES Checklist (Orchid Checklist Volume 1)

Cypripedium parviflorum var. *pubescens* is an accepted name but *Cypripedium pubescens* is listed as a synonym of *Cypripedium parviflorum*.

The Plant List

C. assurgens Raf.*; C. aureum* Raf.*; C. bulbosum* var. *flavescens* (DC.) Farw.*; C. bulbosum* var. *pubescens (*Willd.) Farw.*; C. calceolus* var. *planipetalum (*Fernald) Victorin & J.Rousseau*; C. calceolus* var. *pubescens (*Willd.) Correll*; C. calceolus f. rupestre* Vict. & J.Rousseau*; C. flavescens* DC. *; C. furcatum* Raf.*; C. luteum* var. *angustifolium* Raf.*; C. luteum* var. *biflorum* Raf.*; C. luteum* var. *concolor* Raf.*; C. luteum* var. *glabrum* Raf.*; C. luteum* var. *grandiflorum* Raf.*; C. luteum* var. *maculatum* Raf.*; C. luteum* var. *pubescens* (Willd.) Raf.*; C. parviflorum* var. *planipetalum* Fernald; *C. planipetalum* (Fernald) F.J.A.Morris*; C. pubescens* Willd.*; C. undatum* Raf.*; C. veganum* Cockerell & Barker. (The Plant List, Version 1.1, 2013).

Common names

Large yellow lady's slipper; greater yellow lady's slipper; American valerian; bleeding heart; moccasin flower; monkey flower; Noah's ark; slipper root; Venus shoe; yellow lady's slipper; yellow moccasin flower; yellows; camel's foot; squirrel foot; steeple cap; whippoorwill shoes; nerve root;

Industry names

Cypripedii rhizome; Cypripedium pubescens extract; Lady's slipper; Nerve root

Identification

Cypripedium is a genus of around 60 species. *C. parviflorum* is reported to be the most variable *Cypripedium* species in North America and the three varieties of *C. parviflorum* can be difficult to differentiate. The size of the plant, size of the lip, size and shape of the petals vary from site to site and within colonies and it can hybridize with related species. Plant structure especially depends on environmental conditions.

If the collector is not trained in the identification of the species and its three varieties, and is just searching for any yellow-lipped orchid plant, then the specific plant material is likely to be questionable, particularly without standardization of herbal product ingredients (P. de Angelis, pers. comm. to C. Rutherford, December 2016)

Distribution

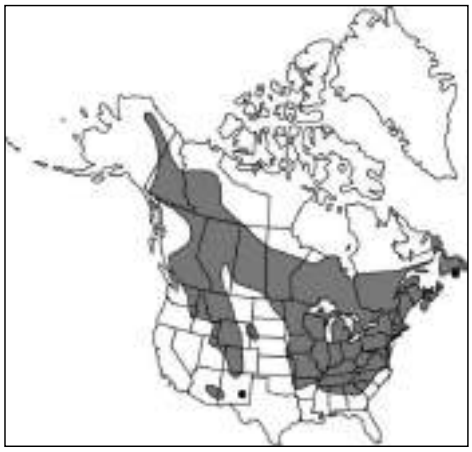
USA

Alaska, Alabama, Arkansas, Arizona, California, Colorado, Connecticut, District of Colombia, Delaware, Georgia, Iowa, Idaho, Illinois, Indiana, Kansas, Kentucky, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Vermont, Washington, Wisconsin, West Virginia, Wyoming

Canada

Alberta Canada, British Columbia, Manitoba, New Brunswick, Newfoundland, Labrador, Nova Scotia, Northwest Territories, Ontario, Prince Edward Island, Quebec, Saskatchewan

Distribution Map



Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 20+ vols. New York and Oxford

Habitat:

Bogs, swamps and rich woods.

Legal / conservation status

The IUCN Red List describes *Cypripedium parviflorum* as a taxonomically complex species, and treats it for their assessment as a single species. It states that '*Cypripedium parviflorum* is under numerous anthropogenic threats especially plant collecting for research, personal garden use, illegal sale for horticultural or medicinal use, and botanical collections or voucher specimens; timber harvest; infrastructure development and road construction; grazing by livestock or wildlife, habitat loss due to some management activities such as recreation activities by direct effect (e.g., destruction of plants) and indirect effect (e.g., alteration of habitat); weed control as the amount of light and competition from other plants appear to have a negative influence in the number of species; fire suppression and mining which generally involves large-scale land disturbance to soil surface conditions and nearby plant communities. In addition, to the human interferences, environmental risks to this species include drought, flooding, climate change and wildfires are also considered major threats. However, the extent of occurrence and area of occupancy of the species are greater than thresholds for any threatened categories and although there are threats to the species and its habitats these are unlikely to cause the population to decline quickly in the near future if suggested conservation measures are applied, public awareness raised and existing conservations measures are kept in place. *C. parviflorum* is therefore assessed as Least Concern' (Rankou, 2014).

NatureServe (2015) states that 'although there may be far more than a thousand populations of this species throughout its extensive range, most are small, and *Cypripedium parviflorum* var. *pubescens* is vulnerable to habitat loss, horticultural collecting, and medicinal collecting. There are very few reports of large, demonstrably secure populations anywhere in North America. All reported populations contain less than 400 individuals, and most contain less than 30. Although quantitative data is not available, information suggests that this species is still in decline, and further measures to protect it should be implemented'.

USA

The conservation status of this species is N4N5 (apparently secure/secure). Currently, no *Cypripedium* species are considered threatened or endangered under the Endangered Species Act (ESA). It is illegal to collect any native plants from land owned by the National Park Service (NPS), and from most other federal lands (e.g. Forest Service (FS), Bureau of Land Management (BLM), Defense Dept.). However, on some federal lands (such as FS, BLM), harvest is allowed with a permit, except if the species is listed as rare on such lands. Both the BLM and the USFS maintains lists of rare species; *C. parviflorum* var. *pubescens* is not listed in the BLM 'Threatened and Endangered Species program' but is listed in the USFS 'Sensitive Species' list in some areas in the Northern, Eastern, and Alaska regions (P. de Angelis, pers. comm. to C. Rutherford, December 2016).

Plant species might be protected on the State-level and what protection that affords differs from state-to-state. Some U.S. states do not have state endangered species acts for plants (such as Indiana); others require collectors to obtain written permission from landowners (such as Minnesota); or require special tags just to transplant the native plant from one place to another (Arizona). There are regulations governing the rights of Native Americans to collect plants of cultural significance or as traditional rights, and there are also rules allowing the general population to collect certain plants from the wild for personal consumption or subsistence use. For commercial purposes, the rules governing collection of plants depends largely on land ownership (private, state, or federal), as outlined above (P. de Angelis, pers. comm. to C. Rutherford, December 2016).

According to a Conservation Assessment for USDA Forest Service Eastern Region, most US states do not track this species, and of those that do, many are unable to accurately distinguish records for *C. parviflorum* var. *pubescens* from varieties *C. parviflorum* var. *parviflorum* and C. *parviflorum* var. *makasin* due to the great morphological plasticity exhibited by plants in different environments and unusually high levels of genetic variation within populations (USDA, 2005)

This plant is listed by the following U.S. federal governments or states. Common names are from state and federal lists.

State	Latin name	Common Name	Level of Conservation
Arizona	*Cypripedium calceolus* var. *pubescens*	yellow lady's slipper	Highly Safeguarded
Connecticut		yellow lady's-slipper	Special Concern
Georgia	*Cypripedium calceolus* var. *pubescens*	large-flowered yellow ladyslipper	Unusual
Illinois		small yellow lady's-slipper orchid	Endangered
Kentucky		small yellow lady's-slipper	Threatened
Massachusetts			Endangered
New Hampshire		small yellow lady's-slipper large yellow lady's-slipper	Endangered Threatened
New Mexico	*Cypripedium calceolus* var. *pubescens*	yellow lady's-slipper	Endangered
New York		small yellow ladyslipper yellow ladyslipper	Endangered Exploitably Vulnerable
Pennsylvania		small yellow lady's-slipper large yellow lady's slipper	Endangered Vulnerable
Rhode Island	*Cypripedium calceolus* var. *pubescens*	large yellow lady-slipper	Endangered
Washington		yellow lady's-slipper	Endangered

In the USA, traditional herbal medicine, plant extracts or other botanical products that are used as ingredients in products for internal human consumption are generally regulated as dietary supplements by the U.S. Food and Drug Administration (FDA). The federal law governing the sale and trade of herbal supplements or dietary supplements is Dietary Supplement Health and Education Act (DSHEA, 1992). Under U.S. law, the FDA regulates the use of common names used on dietary supplement labels under 21 CFR Part 101.4(h). This law stipulates that naming should follow *Herbs of Commerce* (AHPA 1999 & 2000). This publication is a collection of standardized common names for botanicals commonly used as ingredients in dietary supplements. According to this publication, the standardized common name of *Cypripedium parviflorum* var. *pubescens* is "large yellow lady's slipper." Thus, by U.S. law, any dietary supplement using that common name on its label must by law contain *Cypripedium parviflorum* var. *pubescens*, and thus, any laws pertaining to that species (such as CITES regulations) would also apply to that product. (P. de Angelis, pers. comm. to C. Rutherford, December 2016).

In the USA, the manufacture of homeopathic products is standardized, and every manufacturer is required to follow the principles laid down in the HPUS (Homeopathic

Pharmacopoeia of the U.S.). However, there appears to be no global standardisation of herbal products nor their extractive processes and ingredient amount and strength can vary widely.

Canada

The National Status of *C.parviflorum* var. *pubescens* is N4N5 (apparently secure/secure) and it is ranked S2 (Imperilled) in Nova Scotia, Prince Edward Island and Saskatchewan (NatureServe, 2015).

Wild Harvesting

Image Copyright: Russ Kleinman & Allan Campbell

Plants in this genus in general and large yellow lady's-slippers in particular have been collected for centuries by both indigenous and immigrant people for horticultural, herbal and medicinal use. The root was used for its sedative and antispasmodic properties and to counter insomnia and nervous tension. Although some whole-root preparations were aqueous, the pungent, unpleasant smelling roots were usually prepared as tinctures as the active principles are not water-soluble (Wilson, 2007). According to some industry reports, wild collected roots and rhizomes have been up until recently used to manufacture the mother tincture for commercial homeopathy manufacturers.

According to some state regulations, a small amount of plants can be collected from the wild from destroyed sites under rescue programmes (P. Cribb (2016) pers. comm. to C. Rutherford). In other states permits are issued to collect from the wild in cases of habitat clearance, with the proviso that a certain amount are replanted and the rest can be used in commercial operations (C. Schreiner, 2016, pers. comm. to C. Rutherford).

Cultivation

Previously considered difficult to grow in cultivation, developments in artificial propagation in recent years have meant that it is now easy to grow many *Cypripedium* species from seed. In the US, Bill Steele, owner/propagator of Spangle Creek Labs/Itasca Ladyslipper Farm pioneered a propagation technique and he now produces on average around 1000 seedlings per year, selling around half at various stages of maturity from seedlings just out of the tissue culture flask to flowering adults. He estimates that the other two nurseries that

propagate and sell *C. pubescens* produce a smaller volume, and that most of these plants are sold for ornamental domestic use and occasionally for conservation/ restoration purposes. He does not ship internationally and domestic sales are sold as bare root seedlings sealed in plastic bags with all plants certified as laboratory-propagated. Other nurseries in Canada and Europe grow quantities of this species and some manufacturers have direct links with these nurseries. There have been some problems with fungicide on young plants but with the increase in chemical and pesticide restrictions this is becoming less of an issue (W. Steele, 2016, pers. comm. to C. Rutherford)

Cultivated *C.parviflorum* var. *pubescens* in a Dutch nursery / Image copyright Phil Cribb

Phytesia, a nursery in Belgium, is producing large numbers of terrestrial orchids (mainly *Orchis* and *Dactylorhiza*), grown mainly for the European cosmetics industry. It provides between 100 - 300 kilos of plants in vitro annually; one kilogram is about 1000 plants in vitro which equates to around 100,000 and 300,000 in vitro plants per year (P. Lambé, 2017, pers. comm. to C. Rutherford). It states the following on its website:

'Phytesia has developed laboratory cultivation by in vitro sowing in order to ensure the availability of plant material without affecting the wild terrestrial orchid populations. This controlled production is carried out in agreement with the International Regulations (CITES: Convention on International Trade of Endangered Species). For two years, Phytesia has been producing several in vitro varieties of tempered orchids *(Orchis Dactylorhiza, Bletilla*, and *Cypripedium*) intended for prestigious customers from the cosmetic and pharmaceutical sectors. Thanks to the reproduction technology used by Phytesia, our customers can thus guarantee a legal origin of their plant material, and be sure that the development of their products does not involve endangering any species for future generations.'

Image of cultivated *Cypripedium* from Phytesia website

Commercially Traded Forms

Raw material

Live plants

Cultivated plant. Image copyright: Itasca Ladyslipper Farm

Roots and rhizomes

Roots and rhizomes of cultivated *Cypripedium parviflorum* var. *pubescens*. Image copyright: Christian Schreiner

Both live plants and roots and rhizomes are commercially traded by the horticultural industry for both ornamental and pharmaceutical purposes.

Processed Forms

Cypripedii rhizoma / radix: The rhizome and roots of *Cypripedium parviflorum* Salisb.

HS Code: HS 1211.90 (WCO)

Cypripedin: a precipitate from the tincture of *Cypripedium pubescens*

Cypripedium Pubescens Extract

Described as follows in CosIng:

'Cypripedium Pubescens Extract is an extract of the roots of the Lady's Slipper, Cypripedium pubescens, Orchidaceae'

INCI Name: Cypripedium Pubescens Extract.

INN Name: None stated in CosIng database.

CAS #: 84775-54-2 EC#: 283-884-2

HS Code: HS 1302.19 (WCO)

It is used as a skin-conditioning and tonic component of cosmetic products and also in homoeopathic medicines which are infinitesimal dilutions of mother tinctures resulting in no actual content in the finished product.

Method of Extraction:

Homeopathy

The plant material is cut and moisture content is measured. The maceration process then begins and depending on the moisture content an ethanol/water-solution of a certain proportion is filled in a barrel with the plant material. The barrel is closed and the soluble substances of the plants dissolve in the solution. After 10-30 days (depending on the material) the barrel is opened, the content is filled in an hydraulic press and pressed out. The remaining solution is filtered and the outcome is the mother tincture which in turn is used to produce the different potencies for homeopathic remedies (H. Hentrich, 2016, pers. comm to C. Rutherford) The stronger the potency, the greater the dilution of the mother tincture, which means that the remedies often do not even contain a molecular presence of the plant from which they are derived.

Mother tincture. Image copyright Heiko Hentrich

Cosmetic

This species is used in several high end cosmetic products but despite extensive outreach to the cosmetic companies little information has been received, possibly due to confidentiality concerns. According to registered patents various extraction methods are used, some of which are described below:

The plant is cut into small pieces or ground into a powder and placed in a Soxhlet extractor and extracted with any suitable solvent. Typical solvents include water, lower alcohols and mixtures thereof. The solvent is maintained at reflux and the plant body is extracted, typically for a period of from about 6 hours to about 48 hours. The solvent is then separated from the extract either under low pressure or by evaporation, leaving a residue containing the desired plant extract. The residue may be diluted and purified using techniques such as gravity chromatography.

An alternative extraction process involves immersing ground, finely cut or macerated plant body in a solvent bath comprising water and/or lower alcohol(s). The mixture of plant body and solvent is allowed to sit for a period of from about 6 hours to about 48 hours. The mixture is then filtered, separating the solids from the filtrate. The collected solids are then immersed in a solvent bath as described above. That mixture is separated by filtration. The filtrates from both extractions are combined, and concentrated under reduced pressure to obtain a residue. The residue is vacuum dried for about 1 to about 10 hours.

A further extraction process involves adding the ground/macerated plant body to a solvent system (preferably, water and/or lower alcohol(s)), in a ratio of from about 4:1 to about 7:1 by volume to form a mixture. That mixture is then heated to a temperature of about one degree Celsius below the boiling point of the solvent system and stirred for about an hour. The mixture is filtered and the filtrate is washed with fresh solvent in a volume ratio of

about 1:1. The filtrate is then concentrated by forced drying, pressure, heat or other techniques. Preferred solvents include ethanol, methanol, propanol, 2-propanol, water and mixtures thereof.

Trade Recommendations

American Herbal Products Association (AHPA)

Adopted July 1998, as per the 'AHPA Code of Ethics & Business Conduct', the following is a current trade requirement of AHPA members:

'Businesses and individuals in the horticultural and herb trade refrain from domestic or international trade in wild-harvested Lady's Slippers. AHPA encourages its members and others in the herb trade to support research in ecology, demographics, cultural methods, and sexual and asexual propagation of *Cypripedium* species'

United Plant Savers (UpS)

United Plant Savers' mission is to 'protect native medicinal plants of the United States and Canada and their native habitat while ensuring an abundant renewable supply of medicinal plants for generations to come'.

Lady's Slipper Orchid (*Cypripedium* spp.) is included on the UpS "At Risk" List with the following recommendations to UpS members and herbalists:

'No wild harvest is permissible. Use only cultivated resources. Cultivated valerian, cultivated California poppy, and cultivated passion flower are good substitutes.'

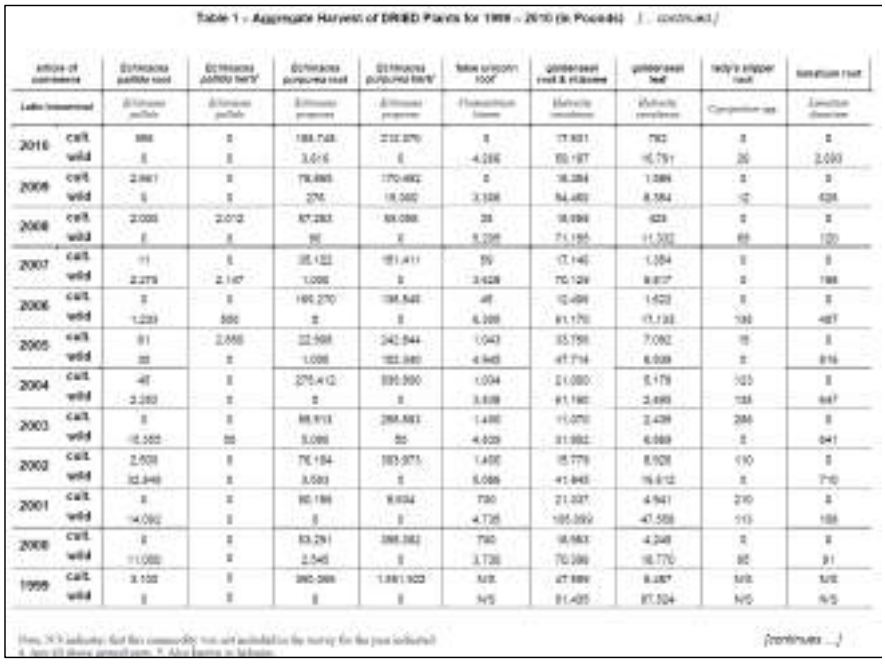
Trade

There are no known species-specific codes that enable tracking import / export trade of this species or of products containing it. As a result searches were made using the CITES Trade database together with general internet searches using the accepted name, *Cypripedium parviflorum* var. *pubescens*, the species name *C. parviflorum,* or using the following terms: Cypripedium pubescens, INCI trade names like 'Cypripedium Pubescens Extract', pharmacopoeial-type names like 'Cypripedii rhizoma', non-proprietary drug names like 'Cypripedin', drug substance names like 'Cypripedium Parviflorum Root', standardized common names such as 'large yellow lady's slipper' or 'small yellow lady's slipper' and synonyms such as *C. calceolus* var. *pubescens* and *C. planipetalum*.

Based on production and trade data available from national and international databases and personal communications, nurseries in the range States, the Netherlands, Germany and Belgium appear to be producing enough cultivated material to supply the global market. According to the CITES-WCMC trade database, the source materials are indicated as being artificially propagated (A). It should be noted that there are continuing discrepancies between exporter- and importer- reported quantities listed in this database.

Harvest data from AHPA Surveys

AHPA's fifth harvest survey report included quantifications of harvests from 2006 to 2010 for 26 botanical commodities derived from 22 plant species, including lady's slipper root (*Cypripedium* spp.; not species-specific). Only minor amounts were shown to be wild-collected (see table) and '*No cultivated harvests were reported for lady's slipper for the 2006 – 2010 harvest years, though earlier harvests recorded dried cultivated root, with a high of 286 pounds reported in 2003*.' In addition, no production, wild nor cultivated, has been reported during the 2011-2012-2013 tonnage survey (M. McGuffin, 2016, pers. comm. to C. Rutherford).



American Herbal Products Association. *Tonnage Surveys of Select North American Wild-Harvested Plants, 2006–2010*. Silver Spring (MD): American Herbal Products Association; 2012

Range States: Canada

Live Plants

According to the CITES trade database and looking at exporter reported quantity a small amount of artificially propagated live plants (less than 5,000) have been exported from Canada over the ten year period (2005-2015) with over half (2594) going to the USA. The majority of the remaining live plants are exported to the EU. An internet search on prices of live plants from Canadian nurseries indicates that cultivated specimens are priced at around CAD 35-50 per plant.

Parts and Derivatives

There is only one record of export of roots, to France – it appears that Canada reported this export as live plants and France reported the import as roots.

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2009	Cypripedium parviflorum	FR	CA			400	live		T	A
2009	Cypripedium parviflorum	FR	CA		400		roots		T	A

Range State: US

All trade

A very small amount of both wild and artificially propagated live plants and roots have been exported to Europe between 2005-2015 with the majority reported by the importer. A search of online nurseries indicates a price of around $6 per seedling and US$40 per blooming plant.

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2006	Cypripedium parviflorum	GB	US		120		live		T	W
2007	Cypripedium parviflorum	GB	US		2		live		T	A
2007	Cypripedium parviflorum	NL	US		61	61	live		T	W
2009	Cypripedium parviflorum	GB	US		1		live		T	A
2012	Cypripedium parviflorum	DE	US		2		roots	kg	T	A
					186	**61**				

Rest of World:

Live plants

According to the importer reported quantity, around 1000 artificially propagated live plants have been exported in Europe, mainly by the Netherlands and Belgium, and imported by Switzerland. There was one recorded trade in *C. planipetalum* , a synonym of *C. parviflorum* var. *pubescens.* There is also some trade recorded only at the genus level that is not included below.

Parts and Derivatives

All trade in derivatives / extracts/ medicine originates in Belgium and is re-exported by Germany to Switzerland, with one trade in roots from the UK to the USA

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2011	Cypripedium parviflorum	CH	DE	BE	20		derivatives	ml	T	A
2011	Cypripedium parviflorum	CH	DE	BE		20	medicine	ml	T	A
2012	Cypripedium parviflorum	CH	DE	BE	20		extract	ml	T	A
2012	Cypripedium parviflorum	CH	DE	BE		70	medicine	ml	T	A
2013	Cypripedium parviflorum	CH	DE	BE		50	medicine	ml	T	A
					40	**140**				
2013	Cypripedium parviflorum	USA	GB			50	roots		T	A

Manufacturers

Canada

Using the **Licensed Natural Health Products Database (LNHPD)** and search term "Cypripedium', one finds a total of 13 NHPs with marketing authorization granted for Canada.

Contains	Product name	Product license holder
Cypripedium pubescens 1.0 DH	Cypripedium Pubescens (granules)	Boiron Canada Inc.
Cypripedium pubescens 1.0 DH	Cypripedium Pubescens (globules)	Boiron Canada Inc.
Cypripedium pubescens	Cypripedium Pubescens (gouttes orales)	Boiron Canada Inc.
Cypripedium pubescens 6.0 K	Homeodel 34	Homeodel Inc.
Cypripedium pubescens 4.0 D	Cypripedium Pubescens (drops)	Homeodel Inc.
Cypripedium pubescens 4.0 D	Cypripedium Pubescens (globules)	Homeodel Inc.
Cypripedium pubescens 4.0 D	Cypripedium Pubescens (granules)	Homeodel Inc.
Cypripedium pubescens 6.0 X	Cypripedium Pubescens (pellets)	Hyland's Homeopathic Canada Inc.
Cypripedium calceolus extract 4:1	Formule C-8	Les Herbages Naturbec Ltée.
Cypripedium pubescens extract 1:400	N.-W	Les Herbes Pures J.B. Ltée
Cypripedium parviflorum extract 1:4	Dan-C	Les Herbes Pures J.B. Ltée
Cypripedium pubescens 4.0 X	Hormaplex	Natural Equivalents Incorporated
Cypripedium pubescens 2.0 X	Cypripedium Pubescens	Natural Equivalents Incorporated

Excerpt from a licensed NHP listing

Natural Product Number (NPN):	80017081
Current status:	Active
Brand name(s):	Cypripedium Pubescens Pellets; Standard Homeopathic Company
Licence holder:	Hyland's Homeopathic Canada Inc.
Dosage Form:	Pellets
Recommended route of administration: Oral	
Recommended dose: Adults 1.0 4.0 pellet 2 3 day(s) Children 0 2 year(s) 1.0 4.0 pellet 2 3 day(s) Children 2 year(s) 1.0 4.0 pellet 2 3 day(s) Recommended use or purpose:	Homeopathic Medicine
Risk Information: Cautions and Warnings:	Consult a health care practitioner before use if you are pregnant or breastfeeding. Consult a health care practitioner if symptoms persist or worsen.
List of medicinal ingredients: Cypripedium pubescens 6.0 X List of non-medicinal ingredients:	Lactose, Sucrose
Date of licensing:	2010-03-25
Date modified:	2016-08-10

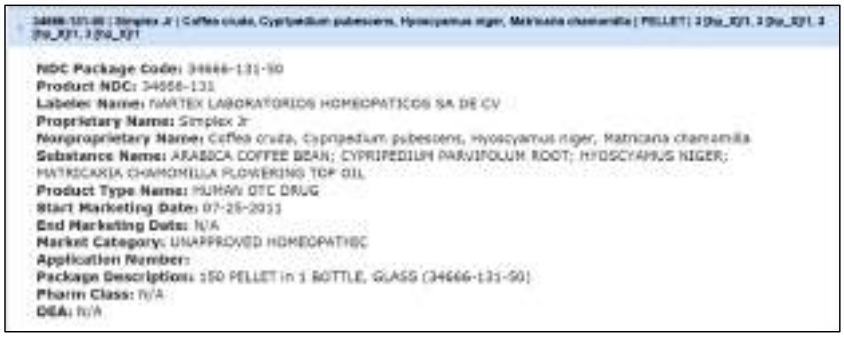
Several manufacturers and distributors for homeopathic medicines in Canada were contacted including the largest, Boiron and Homeodel. Boiron stated the following: 'Cypripedium is not a common homeopathic medicine. Due to its low level of sales, our head office has decided to stop the preparation of the mother tincture and homeopathic dilutions in March 2017 or even before if the stocks are finished.' Homeodel responded as follows: 'Unfortunately we do not have the tincture Cypripedium pubescens. We do not have any intentions of purchasing the following tincture'.

USA

Searching the online FDA National Drug Code (NDC) Directory using the non-proprietary name 'Cypripedium' as the search term, there are 70 results. The following table provides selected examples. All the listed medicines that contain *Cypripedium pubescens* are homoeopathic drug products i.e. the products do not actually contain any measurable amount of botanical substance.

Contains (infinitesimal dilutions)	Product name	NDC holder
Cypripedium Pubescens	Female Stimulant	Apotheca Company
Cypripedium Pubescens	Insomnia	Biovea
Cypripedium Pubescens	Female Stimulant	Deseret Biologicals, Inc.
Cypripedium pubescens	Sprayology SleepEase	Eight and Company
CYPRIPEDIUM PARVIFOLUM ROOT	Hormeel	Heel Inc
Cypripedium	Insomulex	Hello Life, Inc.
Cypripedium pubescens	Hevert Stress Relief	Hevert Pharmaceuticals LLC
Cypripedium pubescens	Sleep Aid	King Bio Inc.
Cypripedium pubescens	Poison Ivy and Oak Relief	King Bio Inc.
Cypripedium Pubescens	Poison Oak / Ivy	Liddell Laboratories, Inc.
Cypripedium pubescens	Harmony Slumber	Life Harmony Energies, LLC.
Cypripedium Pubescens	Silent Nights	Lifewave, Inc.
Cypripedium pubescens	Sleep Now Remedy	Living Well Remedies, LLC
Cypripedium pubescens	Simplex Jr.	NARTEX LABORATORIOS HOMEOPATICOS SA DE CV
Cypripedium pubescens	Sleep Eezzz	New Sun Inc.
Cypripedium	Insomnia	Newton Laboratories, Inc.
Cypripedium Pubescens	InMind	ONE NATURE LABS INC.
Cypripedium pubescens	FibroCane CALM	Premier Bioceuticals LLC.

Example of an FDA NDC listing:


NDC Package Code: 34666-131-50
Product NDC: 34666-131
Labeler Name: NARTEX LABORATORIOS HOMEOPATICOS SA DE CV
Proprietary Name: Simplex Jr
Nonproprietary Name: Coffea cruda, Cypripedium pubescens, Hyoscyamus niger, Matricaria chamomilla
Substance Name: ARABICA COFFEE BEAN; CYPRIPEDIUM PARVIFOLUM ROOT; HYOSCYAMUS NIGER; MATRICARIA CHAMOMILLA FLOWERING TOP OIL
Product Type Name: HUMAN OTC DRUG
Start Marketing Date: 07-26-2011
End Marketing Date: N/A
Market Category: UNAPPROVED HOMEOPATHIC
Application Number:
Package Description: 150 PELLET in 1 BOTTLE, GLASS (34666-131-50)
Pharm Class: N/A
DEA: N/A

An internet search identified products purporting to contain lady's slipper extract.

Manufacturer: King Bio, Inc. 3 Westside Drive, Asheville, NC 28806

HPUS Active Ingredients: Anacardium occidentale, Clematis erecta, Croton tiglium, Cypripedium pubescens, Echinacea purpurea, Erechtites hieracifolia, Graphites, Grindelia, Histaminum hydrochloricum, Mezereum, Rhus toxicodendron, Urtica urens

No responses from manufacturers have been received to date.

India

Available from Homeomart in India as both a homeopathic remedy (imported from Schwabe in Germany) and a mother tincture (source unknown). Deutsche Homöopathie-Union (DHU) is an affiliated company of Schwabe Pharmaceuticals Group so this product may well be from cultivated plants.

Europe

Homeopathy

The main European suppliers to homeopathic pharmacies are Boiron, Herbamed and DHU. Boiron stated that they do not ship remedies containing this species out of the EU but gave no information on the source of the raw material. DHU and Herbamed still produce the mother tincture but are being supplied with cultivated plants. DHU said that they bought cultivated small plants from a nursery in the Netherlands and grew them on in their own nursery to ensure the plants were free of fungicide. The quantity used is very low, with an estimate of yearly consumption of roots in the single digit kilos.

Manufacturer : Boiron, Head Office- 2, av de l'Ouest Lyonnais, 69510 MESSIMY, France

Tel : 04 78 45 61 00; Fax : 04 78 45 61 02

Ingredients: À base de saccharose et de lactose, les granules sont imprégnées de la dilution homéopathique de Cypripedium Pubescens 5CH.

Cosmetics

The cosmetics industry has been harder to engage. For this particular species the only responses were from La Prairie in Switzerland and Sunday Riley in the US;

Cypripedium pubescens extract is listed as an ingredient in the following cosmetics:

La Prairie Switzerland Anti-Aging Stress Cream

European marketer: Parfümerie Douglas GmbH, Kabeler Strasse 4, 58099 Hagen, Deutschland

https://www.douglas.ch/douglas/Pflege-Gesicht-Tagespflege-La-Prairie-The-Anti-Aging-Collection-Anti-Aging-Stress-Cream_productbrand_3000045353.html

Ingredients: Water (Aqua), Caprylic/Capric Triglyceride, Dipropylene Glycol, Glycerin, Cetearyl Alcohol, SD Alcohol 40-B (Alcohol Denat.), Simmondsia Chinensis (Jojoba) Seed Oil, Ethylhexyl Palmitate, Butyrospermum Parkii (Shea Butter), Cyclopentasiloxane, Cetyl Alcohol, Potassium Cetyl Phosphate, Beeswax (Cera Alba), Dimethicone, Polysorbate 60, Glycoproteins, Panax Ginseng Root Extract, Equisetum Arvense (Horsetail) Extract, Valeriana Officinalis Rhizome/Root Extract, Scutellaria Galericulata (Skullcap) Extract, Tocopheryl Acetate, Passiflora Incarnata Flower Extract, Verbascum Thapsus Extract, **Cypripedium Pubescens Extract**, Magnolia Acuminata Bark Extract, Symphytum Officinale Leaf Extract, Mucor Miehei Extract, Sodium Hyaluronate, Centella Asiatica Extract, Rosmarinus Officinalis (Rosemary) Leaf Extract, Retinyl Palmitate, Echinacea Angustifolia Extract, Lentinus Edodes Extract, Tocopherol, Butylene Glycol, Triethanolamine, Carbomer, Polysilicone-11, Citric Acid, Propylene Glycol, Disodium EDTA, Fragrance (Parfum), Hydroxyisohexyl 3-Cyclohexene Carboxaldehyde, Linalool, Benzyl Salicylate, Butylphenyl Methylpropional, Hydroxycitronellal, Phenoxyethanol, Sodium Benzoate, Potassium Sorbate, Methylparaben, Titanium Dioxide, Ext. Violet 2, Blue 1

La Prairie was contacted and stated that 'The Orchidea Cypripedium Pubescens as extract, used in ACTIMOIST® M, product number: 500028-00, which we use is not from wild culture but from artificial plant cultivation and origin'. Active Organics in the US, now under the umbrella of Lipotec, is the manufacturer of ACTIMOIST M, as well as other products containing orchids, but no adequate response has been received to date.

Sunday Riley Good Genes All-in-One Lactic Acid Treatment

Manufacturer: Sunday Riley, 4010 Blue Bonnet Blvd, Houston, TX 77025, USA

Agave Tequilana (Blue Agave) Leaf, **Cypripedium Pebescens (Orchid**), Opuntial Tuna (Prickly Pear) Fruit, Aloe Barbadensis Leaf Extract & Saccaromyces Cerevisiae (Yeast), Glycyrrhiza Glabra Extract, Lactic Acid, Caprylic/Capric Triglyceride (Coconut Oil), Butylene Glycol, Squalene, Cyclomethicone, Dimethicone, PPG-12/SMDI Copolymer, Stearic Acid Glycyrrhiza Glabra (Licorice) extract , PEG-100 Stearate, PEG-75 Meadowsol, Lemongrass Extract, Arnica Extract, Triethanolamine, Xanthan Gum, Phenoxyethanol, Steareth-20, DMDM Hydantoin.

Sunday Riley Start Over Eye Cream

NV-5 AGELESS COMPLEX (OPUNTIA TUNA FRUIT (PRICKLY PEAR) EXTRACT, AGAVE TEQUILANA LEAF (BLUE AGAVE) EXTRACT, **CYPRIPEDIUM PUBESCENS (LADY'S SLIPPER ORCHID) EXTRACT**, OPUNTIA

TUNA FRUIT, OPUNTIA VULGARIS (CACTUS) EXTRACT, ALOE BARBADENSIS LEAF EXTRACT & SACCHARMYCES CEREVISIAE (YEAST) EXTRACT), SQUALENE AND OLEA EUROPEA (OLIVE) FRUIT EXTRACT, ROSA RUBIGINOSA (ROSEHIP) SEED OIL, PUNICA GRANATAUM (POMEGRANATE) SEED OIL, METHYSILANOL CARBOXYMETHYL THEOPHYLLINE, BUTYLENE GLYCOL, PEG-75 MEADOWSOL, AMMONIUM POLYACRYLATE, ISOHEXADECANE, PEG-40 CASTOR OIL, HYDROXYETHYL, ACRYLATE/SODIUM ACRYLOYLDIMETHYL TAURATE COPOLYMER, TETRAHEXYLDECYL ASCORBATE (VITAMIN C ESTER) GLUCOSAMINE HCL & ALGAE EXTRACT & YEAST EXTRACT & UREA, ALGAE EXTRACT, ARTEMISIA VULGARIS (MUGWORT) EXTRACT, GLABRIDINE (LICORICE) EXTRACT, LECITHIN, CHOLESTEROL OLEYL CARBONATE & CHOLESTERYL NANOATE & CHOLESTERYL CHLORIDE, PUNICA GRANATUM (POMEGRANATE) SEED OIL & ASTAXANTHIN & LYCOPENE & ALPHA D-TOCOPHEROL, METHYL PARABEN, PROPYL PARABEN, DMDM HYDANTOIN

Sunday Riley stated that the botanical ingredients they use are sustainably sourced from various US-based manufacturers but did not provide further information.

Actifirm Phyto Relaxin

Manufacturer: Actifirm, Corporate Office, 1410 Westway Cir. Carrollton, TX 75006, USA

Tel: 00 1 972-353-7600 or 866-411-7600

Ingredients: Water, Polymethylsilsesquioxane, Dipropylene Glycol, Centella Asiatica (Gotu Kola) Extract, Echinacea Angustifolia (Coneflower) Extract, Rosmarinus Officinalis (Rosemary) Leaf Extract, Valeriana Officinalis Rhizome/Root Extract, Passiflora Incarnata Flower Extract, Scutellaria Galericulata Extract, Caprylic/Capric Triglyceride, Nylon-12 Fluorescent Brightener 230 Salt, Polyvinylalcohol Crosspolymer, Glycerin, Cetearyl Alcohol, Polysorbate 60, Butyrospermum Parkii (Shea Butter), Simmondsia Chinensis (Jojoba) Seed Oil, Sodium Hyaluronate, Trimethylpentanediol/Adipic Acid/Glycerin Crosspolymer, Ethylhexyl Palmitate, Cyclopentasiloxane, Polysilicone-11, Cetyl Alcohol, Potassium Cetyl Phosphate, Beeswax, Dimethicone, Butylene Glycol, Olea Europaea (Olive) Fruit Extract, Triticum Vulgare (Wheat) Germ Extract, Coleus Forskohlii Root Extract, Polygonum Cuspidatum (Japanese Bamboo) Extract, Verbascum Thapsus Extract, Magnolia Acuminata Bark Extract, Symphytum Officinale Leaf Extract, **Cypripedium Pubescens (Lady's Slipper)**

Extract, Tocopheryl Acetate, Prunus Amygdalus Dulcis (Sweet Almond) Oil, Benzaldehyde Natural, Ethyl Acetate Natural,Citrus Aurantium Bergamia (Bergamot) Fruit Oil, Heliotropine Natural, Vanillin Natural, Citrus Grandis (Grapefruit) Peel Oil, Rosmarinus Officinalis (Rosemary) Leaf Oil, TEA-Carbomer, SD Alcohol 40-B, Phenoxyethanol, Caprylyl Glycol, Sorbic Acid, Titanium Dioxide, Fragrance

Actifirm have been contacted twice but no response has been received to date.

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Case study on Cymbidium species used in the cosmetic and personal care industries

Commissioned by
Federal Food Safety and Veterinary Office FSVO
CITES Management Authority of Switzerland and Lichtenstein

Prepared by Catherine Rutherford

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Executive Summary

First described by Olof Swartz in 1799, the genus *Cymbidium* contains approximately 52 species (eMonocot, 2018) with many cultivars, varieties and natural and cultivated hybrids, widely distributed in SE Asia. *Cymbidium* orchids are usually terrestrial, epiphytic or lithophytic (grow on rocks) They, and their many hybrids, have been popular in cultivation for hundreds of years, due to their adaptability and cold tolerance, together with the spectacular flowers of many species. They are often culturally important and are widely used in the cut flower industry, as well as the medicinal, food and the cosmetic and personal care sectors.

Cymbidium and their hybrids are traded as extracts that are included as ingredients in finished cosmetic products. Research carried out for this report indicates that the trade flow from raw material to finished cosmetic or personal care product can entail unprocessed or processed material (e.g. stems, aerial/flower tips, tissue cultured live plants, dried plants) being sourced from horticultural nurseries in range States (Taiwan (PoC), PR China, and Korea). No nurseries specifically growing orchids for extraction purposes were identified for this report. This material goes through an extraction process, often carried out by companies based in range States, the USA and France.

From CITES trade statistics covering the period 2006-2016 the trade in live specimens and parts and derivatives of this genus shows a clear pattern between a defined group of CITES Parties. The trade in live plants has remained relatively stable over the last decade, with Taiwan (PoC) consistently exporting between 85-95% of all live trade. Much of the trade in dried plants and extracts is comparatively new, commencing in 2012/13, which corresponds with the increased availability of cosmetic products containing extracts of this genus as well as increased submission of patents documenting the cosmetic properties of *Cymbidium*. Overall, the trade is in artificially propagated live specimens and parts and derivatives of this genus and is large in volume, although there are no unique HS customs tariff codes to allow an in-depth analysis. The trade revolves around Taiwan (PoC), PR China, Republic of Korea, Japan and the USA. The Republic of Korea is the only exporter of extracts which implies the manufacture of extracts is being carried out in that country. However, there are several large pharmaceutical and/or cosmetic and personal care companies manufacturing both extracts and finished products containing *Cymbidium* species based in the USA; it has proved difficult to either track this trade or engage with the companies involved. Further outreach to these US based companies is necessary in order to fully understand the trade flow of finished products containing parts and derivatives of this and other orchid genera. In addition, given France's position as a global leader in the innovation and production of cosmetic products, it is likely that they are also producing extracts from this genus for use in this industry, either from live plants grown in nurseries or tissue cultured plants grown in laboratories.

Finished products containing this species are traded globally and are regulated under CITES, but from analysis of the trade data it is unlikely that the full trade is documented or legal under CITES. This may be due to the misinterpretation or lack of knowledge of CITES among industry, deliberate circumvention of CITES regulations, poor knowledge of orchid extracts in cosmetics by CITES and enforcement authorities and the burden placed on both Parties and industry to comply with CITES implementation given the large quantities of commodities in trade

This study focuses on the main species and their parts and derivatives used in the cosmetic and personal care industry.

Taxonomy

There are approximately 52 species of *Cymbidium* (eMonocot, 2018). The species listed in the following table have been identified as being in trade as ingredients used in finished products by the cosmetic and personal care industry. All these species have many hybrids, cultivars and varieties that are also widely traded.

Species, Author, Synonyms	Conservation Assessment*	Common name	Distribution
C. ensifolium (L.) Sw Synonyms: *Cymbidium albomarginatum* Makino; *Cymbidium arrogans* Hayata; *Cymbidium ensifolium f. arcuatum* T.C.Yen; *Cymbidium ensifolium f. falcatum* T.C.Yen; *Cymbidium ensifolium f. flaccidior* Makino; *Cymbidium ensifolium var. misericors* (Hayata) T.P.Lin; *Cymbidium ensifolium var. rubrigemmum* (Hayata) T.S.Liu & H.J.Su; *Cymbidium ensifolium var. striatum* Lindl.; *Cymbidium ensifolium var. susin* T.C.Yen; *Cymbidium ensifolium var. xiphiifolium* (Lindl.) S.S.Ying; *Cymbidium ensifolium var. yakibaran* (Makino) Y.S.Wu & S.C.Chen; *Cymbidium estriatum* Lindl. ex Steud.; *Cymbidium gonzalesii* Quisumb.; *Cymbidium gyokuchin* Makino; *Cymbidium gyokuchin var. arrogans* (Hayata) S.S.Ying; *Cymbidium gyokuchin var. soshin* Makino; *Cymbidium kanran var. misericors* (Hayata) S.S.Ying; *Cymbidium koran* Makino; *Cymbidium micans* Schauer; *Cymbidium misericors* Hayata; *Cymbidium misericors var. oreophilum* Hayata; *Cymbidium niveomarginatum* Makino; *Cymbidium prompovenium* Z.J.Liu & J.N.Zhang; *Cymbidium rubrigemmum* Hayata; *Cymbidium shimaran* Makino; *Cymbidium xiphiifolium* Lindl.; *Cymbidium yakibaran* Makino; *Cymbidium yongfuense* Z.J.Liu & J.N.Zhang; *Epidendrum ensifolium* L.; *Jensoa ensata* (Thunb.) Raf.; *Limodorum ensatum* Thunb.; *Liuguishania Taiwan (PoC)ensis* Z.J.Liu & J.N.Zhang	NT/VU	Chinese: Lan; Guo Lan; Gog Lan; Jian Lang; Dajing Lan; Jinbaolisuxin Lan; Suxin Lan; Guanlanhua; Lancao; Shanlanhua; Kienlan. Medicinal Chinese: Jian Lan Hua; Jian lan gne; Qiu Lan; Ba Yue Lan; Guan Lan Thai: Chu lan	Widely distributed throughout subtropical Asia, China south of the Yangzi, Japan, Indochina, Thailand, Malaysia, Philippines and Sri Lanka at 500-1800 m. Sparsely wooded, grassy slopes and open hardwood forests that are not too open. In China, most common in ravines, in broadleaved or bamboo forest, and in grasslands or steep exposed mountain slopes. Uncommon in Taiwan, growing in hardwood forest in dry conditions. Terrestrial.
C. erythraeum Lindl. Synonyms: *C. hennisianum* Schltr. *Cyperorchis hennisiana* (Schltr). Schltr.	NT	Chinese: Chang Ye Lan	Grows in the forests of the Himalaya of northern India, through Nepal, Sikkim and Butan to Myanmar and the western provinces of China (Sichuan, Xichang, Yunnan) (Du Puy &Cribb) and Vietnam (Flora of China), usually epiphytic on tree trunks in moist forest, also found on rocks
Cymbidium goeringii (Rchb.f.) Rchb.f Synonyms: *Cymbidium formosanum* Hayata; *Cymbidium forrestii* Rolfe; *Cymbidium mackinnonii* Duthie; *Cymbidium pseudovirens* Schltr.; *Cymbidium tentyozanense* Masam.; *Cymbidium uniflorum* T.C.Yen; *Cymbidium virens* Rchb.f.; *Cymbidium virescens* Lindl.; *Cymbidium yunnanense* Schltr.; *Maxillaria goeringii* Rchb.f.	NT/VU	Chinese: 春兰 Chun Lan, Riben Chun Lan, Diaolanhua, Cao Lan, Shan Lan, Shuanfeiyan Japanese: Hokuro, Jiji-baba	Throughout most of China, Bhutan, India, Korea, and Japan a terrestrial species found in stony habitats, shrubby slopes or sparse forests, often in coniferous forests near the sea in Japan.
Cymbidium hookerianum Rchb Syn: *Cymbidium grandiflorum* Griff. *Cyperorchis grandiflora* Schltr.	VU	Chinese: 虎头兰 Hutou Lan	Himalaya in northern India, eastern Nepal , Sikkim, Assam and Bhutan, Myanmar, through China as an epiphyte on trees in damp shady forest or on steep banks or rocks often where thick moss occurs.
C. kanran Makino Synonyms: *Cymbidium linearisepalum* Yamam.; *Cymbidium nigrovenium* Z.J.Liu &	VU	Chinese: 寒兰； Han lan; Cao Lan	Southern China, Hong Kong, Taiwan, Ryukyus, southern Japan, South Korea. A terrestrial species found in open hardwood forest in shade

Species, Author, Synonyms	Conservation Assessment*	Common name	Distribution
J.N.Zhang; *Cymbidium oreophilum* Hayata; *Cymbidium purpureohiemale* Hayata; *Cymbidium sinokanran* T.C.Yen; *Cymbidium tosyaense* Masam.		Korean: 한란	at quite high elevation
C. lancifolium Hook. Synonyms: *Cymbidiopsis lancifolia* (Hook.) H.J.Chowdhery; *Cymbidium aspidistrifolium* Fukuy.; *Cymbidium bambusifolium* Fowlie, F.Mark & F.S.Ho; *Cymbidium caulescens* Ridl.; *Cymbidium cuspidatum* Blume; *Cymbidium gibsonii* Lindl. & Paxton; *Cymbidium javanicum* Blume; *Cymbidium kerrii* Rolfe ex Downie; *Cymbidium maclehoseae* S.Y.Hu; *Cymbidium nagifolium* Masam.; *Cymbidium papuanum* Schltr.; *Cymbidium syunitianum* Fukuy.	NT	Chinese: 兔耳兰; Soushan Hu; Zhupo Lan; Tuer Lan; Diqingmei; Xuli Cao; Indonesia: Ki Adjag	Terrestrial usually found in deep shade in broad leaved forest in rich soil in N. India, Nepal, Bhutan, Burma, S and C China, Taiwan, Korea, Ryukyu Islands, Japan, Indo-China, W Malaysia, Java, Sumatra, Borneo, Moluccas and new Guinea
C. sinense (Jacks.) Willd. Synonyms: *Cymbidium albojucundissimum* Hayata; *Cymbidium chinense* Heynh.; *Cymbidium fragrans* Salisb.; *Cymbidium hoosai* Makino; *Cymbidium hoosai f. hakuran* Makino; *Cymbidium sinense f. albojucundissimum* (Hayata) Fukuy.; *Cymbidium sinense f. aureomarginatum* T.C.Yen*; Cymbidium sinense f. margicoloratum* (Hayata) Fukuy.; *Cymbidium sinense f. pallidiflorum* (S.S.Ying) S.S.Ying; *Cymbidium sinense f. Taiwanianum* (S.S.Ying) S.S.Ying; *Cymbidium sinense f. viridiflorum* T.C.Yen; *Cymbidium sinense* var. *albojucundissimum* (Hayata) Masam.; *Cymbidium sinense* var. *album* T.C.Yen; *Cymbidium sinense* var. *bellum* T.C.Yen; *Cymbidium sinense* var. *margicoloratum* Hayata; *Cymbidium sinense* var. *pallidiflorum* S.S.Ying; *Cymbidium sinense* var. *Taiwanianum* S.S.Ying; *Epidendrum sinense* Jacks.; *Wutongshania guangdongensis* Z.J.Liu & J.N.Zhang	VU	Chinese: Baisui Lan; Baosui Lan; Chun Lan; Mo Lan	Terrestrial in shady, moist forests and along ravines in Northern India, Myanmar, northern Thailand, Vietnam, central and southern China, Taiwan, Ryukyu Islands, Vietnam

Sources: The Plant List (http://www.theplantlist.org/tpl1.1/record/kew-53164); e-Monocot (http://e-monocot.org/taxon/urn:kew.org:wcs:taxon:53164) and Flora of China (http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=108941)

*Du Puy, D. and Cribb, P. (2007). Cymbidium. A Monograph. Natural History Publications, Borneo

Names used by the cosmetic and personal care industries

INCI Names

INCI Name	Definition	Technical Name	Trade Name
Cymbidium Grandiflorum (Orchid) Flower Extract	Extract of the flowers of *Cymbidium grandiflorum.*	Cymbidium Grandiflorum Extract	Orchid Complex OS (clear to yellow liquid)
		Orchid (Cymbidium Grandiflorum) Extract	Unioil Orchid
		Cymbidium Grandiflorum (Orchid) Flower Extract	FSS Wild Orchid Extract (white to very light amber liquid)
		Orchid Extract	Akoactive® Garuda
Cymbidium Erythraeum Flower Extract	Extract of the flowers of *Cymbidium erythraeum*	Cymbidium Erythraeum Flower Extract	
Cymbidium Lancifolium Extract	Extract of the whole plant, *Cymbidium lancifolium*,	Cymbidium Lancifolium Extract	
Rich Brocade Cymbidium Sinense			
Orchid Root Extract	Extract of the roots of various species of *Cymbidium* orchids		Cymbidium Extract
Butylene Glycol/Water/Cymbidium Sinense Extract			Orchibryo
Caprylic/Capric Triglyceride (and) Cymbidium Grandiflorum (Orchid) Flower Extract			Orchid Complex™ OS extract
Cymbidium Goeringii Extract	Extract of the whole plant, *Cymbidium goeringii*		
Cymbidium Grandiflorum Root Extract	Extract of the roots of *Cymbidium grandiflorum*		
Cymbidium Great Flower Bulb Extract	Extract of the bulb of Cymbidium great flower		
Cymbidium Great Flower Extract	Extract of the whole plant, Cymbidium great flower		
Cymbidium Great Flower Flower/Stem Extract	Extract of the flowers and stems of Cymbidium great flower.		
Cymbidium Great Flower Flower/Stem Water	The volatile oil obtained from the leaves, flowers and stems of Cymbidium Great Flower		
Cymbidium Great Flower Leaf Extract	Extract of the leaves of Cymbidium great flower		
Cymbidium Great Flower Leaf Powder	Powder obtained from the leaves of the plant, Cymbidium great flower		
Cymbidium Great Flower Stem Extract	Extract of the stems of Cymbidium great flower		
Cymbidium Kanran Extract	Extract of the whole plant, *Cymbidium kanran*		
Cymbidium Lucky Flower Stem Extract	Extract of the stems of Cymbidium lucky flower		

INCI Name	Definition	Technical Name	Trade Name
Cymbidium Sinense Extract			
Lilium Candidum Bulb/Cymbidium Grandiflorum Flower/Malva Sylvestris Extract	Extract of the bulbs of Lilium candidum , the flowers of *Cymbidium grandiflorum*, and the whole plant, Malva sylvestris.		

Sources: CosIng; Personal Care Products Council - Dictionary

Trade Name (TN) or Trade Name Mixture (TNM)

Cymbidium a Leaf Minute Powder (TN)
Cymbidium Anmitsu Hime extract ET (TNM)
Cymbidium Flower a Distillation Liquid (TN)
Cymbidium Leaf Extract (TNM)
Cymbidium Lucky Flower Stem Extract (INCI)
Cymbidium Marie Laurencin extract ET (TNM)
Cymbidium Scape Extract (TNM)
Cymbidium Whole Herb Extract (TNM)
Jeju Hanran (Cymbidium kanran Makino) extract-sg (TNM)
Orchilean (Cymbidium goeringii extract) TN

Source: Personal Care Products Council - Buyers Guide

Distribution

Cymbidium species are widely distributed in tropical East Asia from India eastwards to China, Japan and Southeast Asia, including Australia, Bangladesh, Bhutan, Cambodia, India, Korea, Laos, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Taiwan (PoC), Thailand, Tibet and Vietnam in lowland and montane forests.

Map showing distribution of *Cymbidium* (Source: eMonocot, 2018)

Appearance

Cymbidium are epiphytic or terrestrial orchids with extremely short rhizomes and pseudobulbs that have long, often arching, leaves and inflorescences that carry several to numerous, showy, medium-sized to large flowers (Teoh, 2016).

Cymbidium kanran CC BY-SA 3.0 Author: Keisotyo

Environmental conservation legislation applicable to *Cymbidium* spp.

Country	Legislation
Australia	The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) list of threatened species lists over 220 species of orchids, but no species of *Cymbidium*. Under the Native Vegetation Act of 1991 of South Australia it is illegal to pick any orchid without a government authorised permit. Australia is listed under Category 1 of the CITES NLP.
Bangladesh	Wild plants including orchids fall under the Wildlife (Conservation and Security) Act, 2012 – formerly Wildlife Protection Act, 1974. It provides conservation and safety of wildlife, forests and biodiversity by repealing the existing law relating to conservation and management of wildlife ensuring the protection of wild plants https://www.google.co.uk/?gws_rd=ssl#q=Bangladesh+flora+law+report+&*. Bangladesh is listed under Category 2 of the CITES NLP.
Bhutan	There are no specific acts or regulations applicable to this genus. However, collection of plants in general and suitable habitat for this genus is afforded protection under the Forest and Nature Conservation Act (1995), Forest and Nature Conservation Rules (2006) and National Forest Policy. Collection of plants may require permits depending on the type of forest or land where collected (e.g. Government versus private forests). Bhutan is listed under Category 3 of the CITES NLP.
Cambodia	There are no specific acts or regulations applicable to orchids. The main legislation regarding environmental protection and natural resource management is the 1996 Law on Environmental Protection and Natural Resources Management . Cambodia is listed under Category 1 of the NLP.
PR China	Wildlife legislation is built around the 1988 Wildlife Protection Law. The 2006 Regulation on Administration of Import and Export of Endangered Wild Animals and Plants is aimed specifically at the protection of CITES-listed species, as well as species under special state protection and the 1992 Regulations for the protection of terrestrial wildlife which implement the Wildlife Protection Law, and address species which are precious, endangered, beneficial or of important economic and scientific research value (terrestrial wildlife regulations, Art. 2). The State Forestry Administration, which lies directly under the State Council, is responsible for the nationwide management of terrestrial wildlife (Wildlife Protection Law, art. 7). China started the "National Wildlife Conservation and Nature Reserve Construction Program" in 2000. Orchid was listed as one of the 15 key wildlife protection groups for priority action plan .China (including Hong Kong SAR) is listed under Category 1 of the CITES NLP.
India	No legislation applicable specifically to this genus was found. It is not listed under Schedule VI of The Wildlife Protection Act, 1972 which affords higher levels of protection to plant species and criteria for their export. Habitat and use of this species found within them falls under the following acts: The Scheduled Tribe and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 allows for the right to access, use or dispose of minor forest produce for designated tribes; The Indian Forest Act, 1927; and The Forest Conservation Act, 1980. Exports of wild-taken specimens for commercial purposes, with the exception of cultivated varieties of plant species included in Appendices I and II is prohibited (Notification No. 2 (RE-98)/1997-2002 dated the 13th April, 1998) (UNEP, 2017). India is listed under Category 2 of the CITES NLP.
Japan	Act on Conservation of Endangered Species of Wild Fauna and Flora 1993. After the revision in 2013, the government adopted "supplementary resolutions" affirming that "preserving biodiversity" was the law's main objective . This Law aims at conserving the natural environment by protecting endangered species of wild fauna and flora. Japan is listed under Category1 of the CITES NLP.
Republic of Korea	The2004 Wildlife Protection and Management Act is the main legislation regarding environmental protection and natural resource management. The Republic of Korea is listed under Category 1 of the CITES NLP.
Lao People's Democratic Republic	Restrictions limit the harvest of forest products (including orchids) to production forests with sustainable management plans (Lao Forestry Law No.6/NA), although there is also no available evidence that these plans have been developed. Legality of orchid harvesting and trading is framed by national law through The National Forestry Law (24 December 2007) N°6/NA, Wildlife Law (24 Dec 2007- N°7/NA) and the NBCA Law (PM Decree No 164/1993) and Environment Law 2007(Articles 9-12) and Environmental Protection Law No 02-99/NA. Provincial Governor decrees on the banishment of collection and transportation of wild orchids are also in place. The export of wild and/or semi-cultivated orchids, in any form or otherwise semi-processed, is now illegal in Lao PDR unless CITES permits are obtained. No quotas are permitted for wild orchid trade in every province within Laos and collection or transportation is considered illegal. Lao PDR is listed under Category 3 of the CITES National Legislation Project (NLP). See document Doc.13 of the 67th meeting of the CITES Standing Committee https://www.iucn.org/sites/dev/files/import/downloads/piloting_cites_case_study_iucn_jul_09.pdf
Nepal	The Forest Act 1993, and Forest Regulations 2051 (1995) as amended by the Forest (Third Amendment) Rules, 2062 (2005), specifies all orchids in Nepal are protected under Schedule 3. However, the Government of Nepal published a notification on April 14th, 2008 permitting collection of wild orchids for trade (Subedi *et al*., 2013). Nepal is listed under Category 3 of the CITES NLP. New Constitution adopted in October 2015
Myanmar	Since 1994 all wild orchids have been protected by national legislation under the Protection of Wildlife and Conservation of Natural/Protected Areas Law, 1994. A permit is required to harvest or sell all wild orchids. Myanmar is listed under Category 3 of the CITES NLP.
Papua New Guinea	There are no specific acts or regulations applicable to orchids. The main legislation regarding environmental protection and natural resource management is the Conservation and Environment Protection Authority Act 2014. PNG is listed under Category 1 of the CITES NLP.
Philippines	Wildlife Resources Conservation and Protection Act (Republic Act No. 9417). The Act provides for the conservation, preservation and protection of wildlife species and their habitats, in order to preserve and encourage ecological balance and biological diversity; it provides, furthermore, for the control and supervision of wildlife capture, hunting and trade; finally it provides for supporting and promote scientific research on the protection of biodiversity. The provisions of this Act shall apply to all wildlife species overall, including those living in the protected areas. The Philippines are listed under Category 2 of the CITES NLP.
Sri Lanka	All orchids are protected under the Fauna and Flora Protection Ordinance (Amend. Act No 2 of 2009). Under the Forest Ordinance, Extraordinary Gazette Notification No. 05.12.2005 issued by The Forest Department, orchids are forest produce which require permission for any removal. Sri Lanka is listed under Category 3 of the CITES NLP.
Thailand	Collection of wild orchids from the forest is prohibited, except for research, and is not allowed for trade. However, personal consumption is limited to 20 plants or less and there are additional bans, fines and prison terms associated with their harvest from protected areas (e.g., National Park Act B.E. 2504). The Plant Act (1992) was revised to comply with the CITES, promoting artificial propagation of CITES-listed orchids and to regulate

Country	Legislation
	international trade. This was echoed under a Notification of the Department of Agriculture who in 1998 declared that only artificially propagated orchid plants may be exported and all relevant nurseries be registered with the Thai CITES Management Authority for flora. Also relevant for habitat protection are the 1961 National Park Act and the 1964 Forest Reserve Act (see http://tinyurl.com/ze373bf). Thailand is listed under Category 1 of the CITES NLP
Viet Nam	There is no specific legislation regarding this genus, but the protection and sustainable use of wildlife falls under the Law on Forest Protection and Development (2004). Implementing regulation for the Forest Law is the Decree No. 32/2006/ND-CP on Management of Endangered, Precious and Rare Forest Plants and Animals. Although all wild harvested terrestrial animals are not granted a CITES export permit, wild harvested orchid species can be exported (see https://cites.org/common/prog/policy/Vietnam_wildlife_trade_policy_review.pdf). Viet Nam is listed under Category 1 of the CITES NLP

According to the Global Red List of Japanese Threatened Plants the following species have conservation assessments.

Species	China	Japan	Republic of Korea	Taiwan (PoC)
Cymbidium aberrans		EN		
Cymbidium dayanum var. *leachianum*		CR		
Cymbidium ensifolium var. *ensifolium*	VU	CR		NT
Cymbidium kanran	VU	EN	CR	VU
Cymbidium koran		CR		
Cymbidium lancifolium var. *lancifolium*		EN	CR	
Cymbidium macrorhizon		NT	VU	EN
Cymbidium nagifolium		VU		
Cymbidium sinense	VU	CR		

Source: see https://www.kahaku.go.jp/english/research/db/botany/redlist/list/list_05_240_1.html

Horticultural, medicinal and food uses

Cymbidium are easy to grow and make exceptional pot plants with flowers that can last from 8-10 weeks, and are also producers of excellent, long lasting cut flowers (Du Puy and Cribb, 2007). They are widely cultivated globally, including in Taiwan (PoC), the Republic of Korea, China and smaller amounts in Europe (the Netherlands, Belgium and Germany).

Various species of *Cymbidium* have also been widely used as traditional medicine to treat, among other ailments, coughs, stomach ache, rheumatism, neuralgia, sores and burns, diarrhoea and dysentery, gonorrhoea and syphilis, and to strengthen lungs. There is no extensive usage of *Cymbidium* in Traditional Chinese Medicine (TCM) due in part to the ready availability of many alternative remedies (Teoh, 2016); however there is some research into the efficacy and active ingredients of these species (Yoshikawa *et al*. 2014; Balzarini *et al.* 2004; Gaytan *et al.* 2013). Species have been used medicinally and commercially in Nepal, in Ayurvedic medicine (Subedi *et al.* 2013). Species of *Cymbidium* have also been used as food, with the flowers of some species used in curries and preserves and the pseudobulbs eaten raw or cooked (Du Puy and Cribb, 2007).

Several products were identified for this report that claim to increase stamina and energy and improve weight loss, marketed by the health supplement industry mainly in the USA. The active ingredient in these supplements is advertised as 'Orchilean', a trade name for

Cymbidium Goeringii Extract. No peer reviewed research papers were identified for this report to support the manufacturers' claim that this ingredient acts as a stimulant, and to date no response has been received from the US companies contacted. There is a possibility that these products do not actually contain any orchid extract. It was also not possible track the trade flow and verify where the products were manufactured, in Asia or the US.

Cosmetic and personal care use

The use of *Cymbidium* species in the cosmetic and personal care industry has increased since 2012, in line with the use of other orchid species used by the same industry. The market for this genus centres around the Republic of Korea, Taiwan (PoC), China, Japan and USA.

Since 2012, the Clean Energy and Eco-technology Centre of Taiwan Industrial Technology Research Institute (ITRI) has been researching the potential of orchid extracts for use in biotech products. According to the centre, a number of orchid derivatives have been found to be especially effective at retaining moisture and have anti-oxidant properties. ITRI has already helped develop a number of products including orchid-based facial masks and toothpaste, as well as an orchid-based soft drink. Taiwan Orchid Innovative Biotech has been undertaking research in orchid-based body care products since 2007, working with the Orchid Research Centre, which was established in 2009 at Tainan's National Cheng Kung University, and the company has signed a memorandum of understanding with Fu Jen Catholic University in New Taipei City to set up a research centre at that school devoted to analyzing the properties of orchids. The Woei Shyang Dar Enterprise Company launched a line of cosmetics containing orchid extracts in 2012; the company then began to work with ITRI to produce toothpaste containing orchid and bamboo extracts, which are believed to improve gum health. Before working with ITRI, all of the orchid extracts the company used were imported from the UK but in 2013 it shifted to extracts from locally grown plants (Taiwan Today, 2013). No producer of extracts of *Cymbidium* in the UK was identified for this report.

Many products were identified as containing extracts of *Cymbidium* species in the US, marketed by large cosmetic and personal care companies that include Revlon, Ted Gibson and Estee Lauder. However, responses from the US based manufacturers have been poor and several companies have stated that this project is not a high priority issue for them. Two large chemical companies in the US, Ashland and United Guardian, produce 'Cymbidium grandiflorum extract'; however it has not proved possible to follow these extracts and finished products using the CITES trade database.

According to a Dutch orchid expert, nurseries in the Netherlands do not have the capacity to deliver the large scale supply of *Cymbidium* species that would be necessary for their use in the cosmetic and personal care industry (Bronsema, 2018).

Fragrant species include *Cymbidium eburneum, C. sinense, C. ensifolium, C. kanran, C. faberi* and *C. goeringii*. These have been used extensively in the fragrance industry, particularly in Japan (Kaiser, 1993; Cribb, pers. comm. 2018); however, modern perfumes are now made from synthetically produced fragrance reconstructions and do not involve any real orchid material or extract (Clery, pers. comm. 2016). According to Arctander (1960) oil produced from *Cymbidium virescens* (a synonym of *C. goeriingii*) is used to perfume cosmetic products in south east China (Arctander, 1960).; this use could not be verified further for this report.

Wild Harvesting

Although there is some evidence of wild harvesting there is no data to quantify the extent and effect of this trade and no specific incidents of wild trade was identified for this report. According to Jian and Zhu (2013) "in recent decades, the over-collection of wild *Cymbidium* species has been a direct cause for the rarity and endangered nature of these species and populations, which led to a further loss of their genetic diversity and the alteration of their population genetic structure." However, they go on to state that a large and increasing number of *C. kanran* cultivars have been developed. Their study evaluated fifty-four *C. kanran* cultivars from China, Japan and South Korea, suggesting that the commercial supply may be coming mostly from cultivation (Brinckmann, 2014). Wu et al (2010) state that consumer demands have created a significant pressure on wild populations of *Cymbidium goeringii* and, that to help conserve natural populations of this species, investigations into methods of cultivation have begun recently; however, Wang et al (2009) report that it has been cultivated in China for its variegated leaves, fragrant flowers and peloric flower structures for more than ten centuries (Brinckmann, 2014).

Cultivation

Cultivation of live plants and cut flowers

Orchids have probably been cultivated in China for over two thousand years, and *Cymbidium* species are thought to be some of the earliest cultivated, due to the simple elegant form of the plant and the shape and delicate fragrance of the flowers (Du Puy and Cribb, 2007). A number of cultivated species that have been selected from wild populations now exhibit extreme variation; this is particularly true of *C. ensifolium*, *C. goeringii*, *C. sinense*, and *C. tortisepalum*. Some of this variability may be the result of hybridization and introgression in the wild. The large number of recently described naturally occurring hybrids in *Cymbidium* can be explained by the rapid increase of disturbed habitats in China, which has allowed previously ecologically isolated species to colonize disturbed areas, such as those left after logging or land-use change (Flora of China, 2018). The five best known species cultivated in China are *C. ensifolium*, *C. kanran*, *C. goeringii*, *C. sinense*, and *C. faberi* (Flora of China Editorial Committee. 2009). The genus has been in cultivation in Japan since the early 18th century and they are grown primarily for their scent and gracefulness of their

leaves. In Europe, the earliest record of the genus in cultivation is in 1791, and in India is in the 1830s (Du Puy and Cribb, 2007). Many varieties, cultivars and natural and artificial hybrids are also cultivated on a large scale.

Nurseries in the Netherlands produce cultivated *Cymbidium* species but investigations carried out for this report indicate that all are grown as potted plants or for cut flowers and are destined for the horticultural and floral industries. A report published in 2015 for the National Cut Flower Centre states that Thailand has 3,000 hectares (ha) dedicated to growing orchids for the cut flower industry, Taiwan (PoC) has 662 ha, the Netherlands 212 ha and Japan 157 ha (Hanks, 2015). No nursery in Europe was identified as producing material for use in the cosmetic and personal care industry.

Taiwan (PoC) cultivates more than 170 ha of *Cymbidium* species, mainly in Dongshi and Houli district of Taichung city, and Puli, Yuchi and Xinyi townships of Nantou County. There are more than 100 varieties of oriental cymbidium in Taiwan (PoC), and the main varieties under large scale cultivation are *Cymbidium ensifolium*, *C. sinense* and *C. goeringii*, all of which have abnormal/large flowers and/or variegated leaves. The main export cultivars are *Cymbidium ensifolium* 'Tie Gu', *Cymbidium ensifolium* 'Cai Hong' and *Cymbidium sinense* 'Shan Chuan' (Taichung District Agricultural Research and Extension Station, 2014).

In India, the Arunachal, Sikkim and Darjeeling hills with cool summer nights and monsoonal summer rain are ideal for cymbidium cultivation. In Sikkim, more than 250 hybrids of cymbidium orchids are commercially cultivated in and around 25 ha of land and about 500,000 spikes are produced annually (De *et al.* 2014). However, this trade is not reflected in the CITES trade database.

Korea, Japan and Australia are also exporting live plants according to the CITES trade database. However, no nurseries in these countries responded to queries for this report.

Cultivation for extraction purposes

Extracts of *Cymbidium* species are obtained from any part of a plant (dried or live), including the stems, roots, leaves and flowers. Information from the cosmetic industry suggests that the raw material for use in the manufacture of these extracts is cultivated in Taiwan (PoC), Korea and China. According to the CITES trade data, it appears that the majority of extracts are manufactured in Korea; however several companies in the US, China and Japan also appear to be producing extracts for use in the cosmetic and personal care industry, as well as producing and exporting finished products.

Commercially traded forms

Raw material

- **Live plants –** live plants from artificially propagated sources are in commercial trade. Extracts, for use as a cosmetic ingredient, can be made from whole plants of *Cymbidium*

- **Stems** – stems from artificially propagated sources are in commercial trade. Extracts, for use as a cosmetic ingredient, can be made from the stems of *Cymbidium.*

- **Roots** – roots from artificially propagated sources are in commercial trade. Extracts, for use as a cosmetic ingredient, can be made from the roots of *Cymbidium.*

- **Flowers** – a very small amount of flowers from artificially propagated sources are in commercial trade. The most widely advertised extract 'Cymbidium Grandiflorum Flower Extract' appears to be made from the flowers, but exact trade flows are hard to determine.

The use of raw material in traditional medicines*:*

- **Traditional Chinese medicines (TCM)** – this genus is not listed in the Chinese Pharmacopeia (2015 version) and no information on the commercial use of this genus in TCM was identified.

Processed forms

- **Fragrances** - this species was not found in trade as a fragrance ingredient (M. Vey, 2016).

- **Dried plants** – dried plants from artificially propagated sources are in commercial trade (see TRADE section). Extracts, for use as a cosmetic ingredient, can be made from dried plants of *Cymbidium.*

- **Derivatives** – derivatives from artificially propagated sources are in commercial trade

- **Cultures** – tissue cultures from artificially propagated sources are in commercial trade.

- **Extracts –** extracts from artificially propagated sources are in commercial trade.

Patents outlining the potential of this species as a cosmetic ingredient and the manufacture of the extracts have been identified for this report, all based in Asia. The following weblinks are an example of those found.

https://patents.google.com/patent/KR20160091593A/en

https://patents.google.com/patent/CA2825372C

https://patents.google.com/patent/CN107007492A/en?oq=%22cymbidium+grandiflorum%22+%22flower+extract%22

https://patents.google.com/patent/KR20180020195A/en?q=cymbidium&q=cosmetics&oq=cymbidium+cosmetics&sort=new

https://patents.google.com/patent/CN107260959A/en?q=cymbidium&q=cosmetics&oq=cymbidium+cosmetics&sort=new

https://patents.google.com/patent/CN107137305A/en?q=cymbidium&q=cosmetics&oq=cymbidium+cosmetics&sort=new&page=1

Methods of extraction

A general description of how botanical extracts are processed for use in cosmetic and personal care products is provided below. These are either used to make a claim of the plant being present, or to give a specific activity to a skincare product.

Any part of the plant, or a whole plant, can be used and the material is usually dried and immersed whole or crushed in a solvent (chemical, water, butylene glycol) with between 10-25 kg of plant material per 100kg of solvent. The solvent could be natural or synthetic, and oil or water soluble. The mixture is stirred and left to macerate for as long as necessary. If the extraction process requires a specific level of active chemicals in the solvent, this is monitored and the maceration is stopped once the correct level is achieved. The extract is then chilled and filtered to remove the plant material and produce, as far as possible, a clear extract, or the filtrate may be dried and crushed to produce a fine powder. Dependent again on the requirements, the extract may be decolourised (using activated charcoal) or preserved (water based extracts). This process is mostly considered to be chemical (by extracting the active chemicals into a solvent) and most of the extracts are liquid so they can easily be added to skincare liquid formulations (Alban Muller short film on extraction process, 2017; R. Borner, pers. comm. to M. Groves, 2016).

Selected finished products in trade

Product Name: Various products from several species of *Cymbidium.* **Marketer:** Kawano Mericlone Co., Ltd. 562-1 Kitasho Wakimachi Mima Tokushim 7793604 Japan. Tel: 81 883 52 2189 Fax: 81 883 53 9276 Website: kawano-mericlone.com/en/

Product Name: Dynamik Muscle Savage Roar. **Marketer***:* Dynamic Muscle, 1120 Holland Drive #20, Boca Raton, FL 33487 or 1141 S Rogers Cir STE 3 Boca Raton, FL 33487-2789, USA. Email: cs@dynamikmuscle.com Website: www.dynamikmuscle.com **Ingredients**: Caffeine Anydrous (300MG), **Orchilean (Cymbidium Goeringii Extract)**, Hordenine

Product Name: Petal Essence™ eye and cheek products range (Face Accents, Eye Definer, Eye Color Trio)

Marketer: Aveda Corporation (owned by Estée Lauder), 4000 Pheasant Ridge Dr Ne, Blaine, MN 55449-7106, USA. Tel: +1 (763) 783-4250 Fax: +1 (763) 783-4110

Ingredients: e.g. Aveda Petal Essence Cheek Colour - Mica, Dimethicone, Squalane, Zinc Stearate, Magnesium Stearate, Silica, Magnesium Myristate, Rice Starch, **Cymbidium Orchid Flower Extract**, Jasmine Flower Wax, Rose Geranium Wax, Caprylic/Capric Trigyceride, Ascorbyl Palmitate, Tocopherol, Methicone, Soybean Oil, Lavender Oil, Linalool, Sodium Dehydroacetate, Methylparaben, Propylparaben, Titanium Dioxide (Ci 77891), Ultramarines (Ci 77007), Red 7 Lake (Ci 15850), Manganese Violet (Ci 77742), Yellow 5 Lake (Ci 19140), Red 22 Lake (Ci 45380), Red 30 Lake (Ci 73360), Bismuth Oxychloride (Ci 77163), Red 33 Lake (Ci 17200), Ferric Ferrocyanide (Ci 77510), Iron Oxides (Ci 77491, 77492, 77499), Red 6 (Ci 15850), Red 28 Lake (Ci 45410), Blue 1 Lake (Ci 42090), Red 34 Lake (C 15880), Yellow 6 Lake (Ci 15985)

Product Name: Flormar Smooth Touch Foundation - 01 Light Porcelain

Marketer: kosan kozmetik pazarlama ve ticaret a.ş. Gebze organize sanayi bölgesi ihsan dede cad. 900.sk no:133 gebze kocaeli, turkey. Tel: +90262 751 03 33 (pbx) fax: +90262 751 02 91 Website: http://www.flormar.com/English/

Ingredients: water, dimethicone, cyclopentasiloxane, butylene glycol, peg-10 dimethicone, polymethylsilsesquioxane, glycerin, trimethylsiloxysilicate, disteardimonium hectorite, sd alcohol 40-b, phenoxyethanol, sodium chloride, polysilicone-11, triethoxycaprylylsilane, aluminum hydroxide, sodium pca, fragrance, urea, caprylic/capric triglyceride, ethylhexylglycerin, algae extract, soluble collagen, trehalose, leuconostoc/radish root ferment filtrate, polyquaternium-51, **cymbidium grandiflorum flower extract**, nelumbo nucifera flower extract, sodium hyaluronate, chlorphenesin, propylene glycol, fig (ficus carica) fruit extract, cotton (gossypium hirsutum) seed extract, linseed (linum usitatissimum seed extract, sodium dehydroacetate. May contain: titanium dioxide, iron oxides.

Product Name: Skinn Orchid Gel Primer

Marketer: Skinn Cosmetics, LLC, 4733 Torrance Blvd., Suite #974, Torrance, California 90503, USA Tel: North America / 866-DIMITRI (866-346-4874) Outside North America/ 1-951-699-7601. Email: customerservice@skinn.com Website: http://www.skinn.com/

Ingredients: Cyclopentasiloxane, Tapioca Starch, Dimethicone Crosspolymer, Polymethylsilsesquioxane, Ethylene/Acrylic Acid Copolymer, Caprylic/Capric Triglyceride, **Cymbidium Grandiflorum (Orchid) Flower Extract**, Retinyl Palmitate, Ascorbyl Palmitate, Tocopheryl Acetate, Salicylic Acid, Meadowfoam Estolide, Manganese Violet (Ci 77742), Fragrance (Parfum)

Product Name: Tsi-La Eau de Parfum Mini Oil Collection and Tsi-La Kizes Perfume Oil

Marketer: Tsi-La Organics Customer Service PO Box 401 Plumsteadville, PA 18949, USA. Tel: 215-750-9996 Fax: 215-478-6602. Email: info@tsilaorganics.com

Ingredients: Certified Organic Simmondisa Chinesis (Jojoba) Seed Oil, Caprylic/Capric Triglyceride (coconut) Oil, Natural & Organic Fragrance (No synthetic fragrance, preservatives or artificial colors. 100% pure plant essences), **Cymbidium Grandiflorum (Orchid) Flower Extract**, Tocopherol (GMO free from a Plant Source)

Product Name: Supersexy Foaming Mousse, Beautifullest Powerball Styler, Showstopper Volume Gelee and Runway Ready Volume Mist. All cite "Cymbidium grandiflorum flower extract" as an ingredient

Marketer: Ted Gibson, USA. Website: http://tedgibson.com/

Ingredients: Water, Propylene Glycol, Ethanol, HydroxycetylHydroxyethyl DimoniumChloride, Polyvinylpyrrolidone/Vinyl Acetate Copolymer, PEG-40 Hydrogenated Castor Oil, Fragrance, VP/Methacrylamide/Vinyl Imidazole Copolymer, Phenoxyethanol, CaprylylGlycol, Hydrolyzed Wheat Protein, Hydrolyzed Rice Protein, Sodium Sorbate, Citric Acid, Glycerin, **Cymbidium Grandiflorum Flower Extract,** Leuconostoc/Radish Root Ferment Filtrate

Product Name: Beauty Bermuda Triangle Undereye corrector includes "Cymbidium grandiflorum flower extract" as an ingredient. Website: https://tinyurl.com/myk4pv8

Marketer: Sue Devitt, 1040 Avenue of the Americas, New York, New York 10018, USA. Tel: +212-673-7104 Fax: +212-673-7402

Website: https://tinyurl.com/kqgbty8

Ingredients: Cyclopentasiloxane, Octyldodecyl Stearoyl Stearate, Paraffin, Nylon 12, Polybutene, Ozokerite, Tocopherol, Capric/Caprylic Stearic Triglyceride, Disteardimonium Hectorite, Ascorbyl Palmitate (Vitamin C), **Cymbidium Grandiflorum Flower Extract**, May Contain (+/-): Titanium Dioxid, Iron Oxides Mica

Product Name: Herbivore Botanics “Orchid” range or sets containing the “Orchid” range of products (Orchid Facial Oil, Orchid Facial Oil Set, Orchid Facial Oil Roller, Mini Facial Oil Set, Ultimate Skin Care Collection for Normal / Any Skin Type , travel Set for Normal / Any Skin Type)

Marketer: Herbivore Botanicals, 2315 Western Ave, Ste 310, Seattle, Washington 98121-1636, USA. Email: info@herbivorebotanicals.com

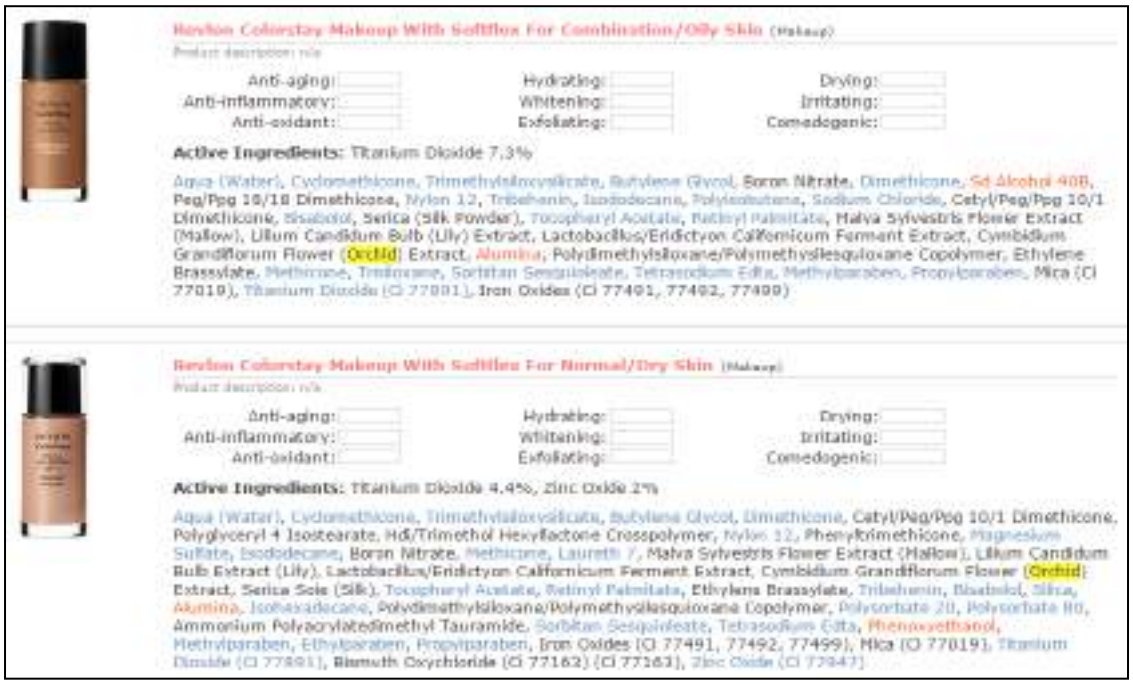
Ingredients: Example Orchid Facial Oil (Capric Triglycerides (Fractionated Coconut Oil), **Cymbidium Grandiflorum (Orchid) Flower Extract**, Camellia Oleifera (Camellia) Seed Oil, Simmondsia Chinensis (Jojoba) Seed Oil, Amaranthus Squalane Oil, Tocopherol (Vitamin E), Jasminum Sambac (Jasmine) Absolute)

EXTREME LIFT ANTI-WRINKLE CREAM WITH ORCHID

Product name: Extreme Lift Anti-Wrinkle Cream with Orchid

Manufacturer: Plante System, part of Arkopharma, **Address:** Zi de Carros Premiere ave 2709, Carros, 6511, France Phone: 33-4-93-29-11-28 Fax: 33-4-93-29-11-62 Web: www.arkopharma.com

Ingredients: Aqua - Simmondsia Chinensis Seed Oil - Carthamus Tinctorius Seed Oil - Butyrospermum Parkii Butter - Mel – Xylitol – Glycerin - Cetearyl Olivate - Sorbitan Olivate - Cetyl Palmitate - Sorbitan Palmitate – Ribose - Oryza Sativa Bran Oil Extract - Theobroma Cacao Extract - Arctostaphylos Uva Ursi Leaf Extract - Calendula Officinalis Flower Extract - Olea Europaea Leaf Extract - Hippophae Rhamnoides Fruit Extract - Camellia Sinensis Leaf Extract - Macadamia Ternifolia Seed Oil - **Cymbidium Grandiflorum Flower Extract** - Macadamia Ternifolia Seed Extract - Phytic Acid - Caprylic Capric Triglyceride - Tocopherol - Helianthus Annuus Seed Oil - Xanthan Gum - Potassium Hydroxide - Potassium Sorbate - Capryloyl Glycine - Levulinic Acid - Sodium Levulinate - Alpha-Terpineol – Parfum - Benzyl Cinnamate – Linalool - Benzyl Benzoate - Citronellol



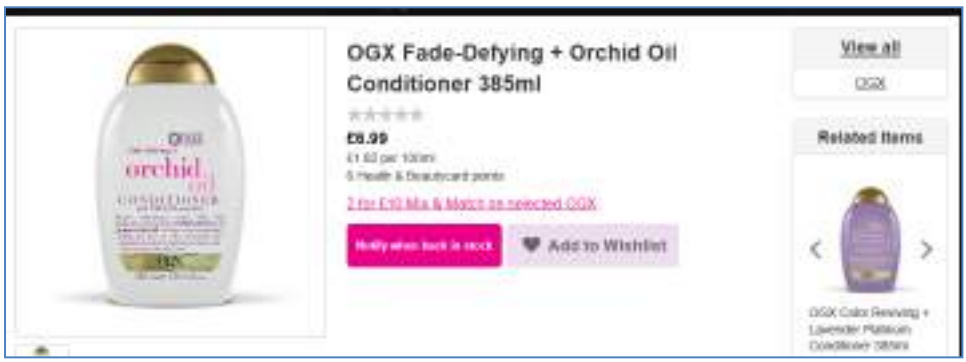
Product Name: Revlon Colorstay Makeup with Softflex for combination/oily skin and Revlon Colorstay Makeup with Softflex for normal/dry skin

Marketer: Revlon, One New York Plaza, New York, 10004, USA. Tel: 0800.0852716 or Website: www.revlon.com

INCI: Caprylic/Capric Triglyceride and Cymbidium Grandiflorum Flower Extract

'Our new orchid extract is an infusion of Cymbidium orchids into fractionated coconut oil. Orchids have long been used for reparative and protective properties, moisturizing, fighting free radicals, and reducing the appearance of fine lines. High end skin care products use wonderful botanicals like orchids because of their superior profile, rich in minerals and moisturizing compounds. Use 2 to 30% in products like lotions, shampoos, conditioners, lip balms and glosses, butters, lotions and creams**.'**

Majestic Mountain Sage, 2490 S 1350 W, Nibley UT 84321, USA. Phone: 435 755 0863, Fax: 435 755 2108

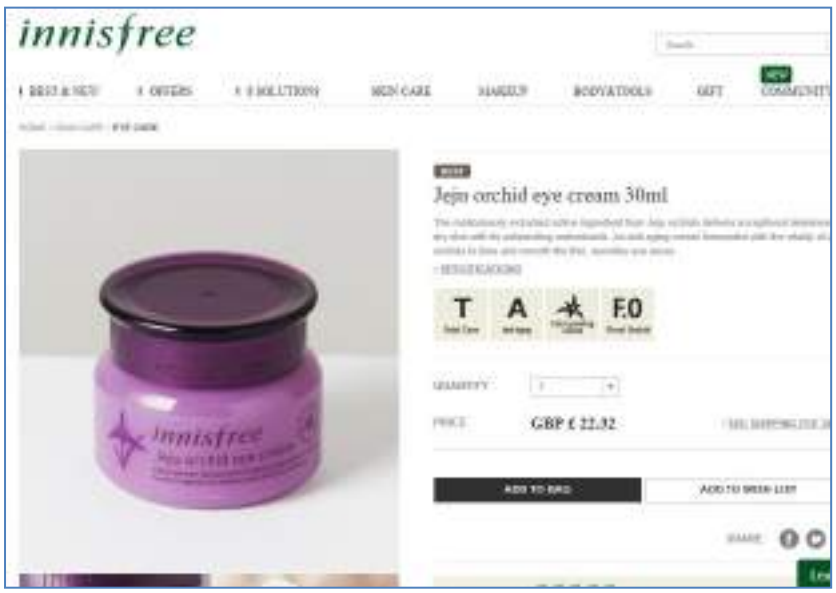


Product Name: Fade Defying Orchid Oil Conditioner

Product Marketer: Superdrug, 51 Sydenham Road, Croydon, Surrey, CR0 2EU UK. Website: www.superdrug.com. Owned by A S Watson, the world's largest health and beauty retail group, based in Hong Kong (SAR).

Aqua/Water/Eau, Cetearyl Alcohol, Glycerin, Behentrimonium Chloride, Cetyl Alcohol, Dimethicone, **Cymbidium Grandiflorum Flower Extract**, Vitis Vinifera (Grape/Grain De Raisin) Seed Oil, Euterpe

Oleracea Fruit Extract, Malpighia Glabra Fruit Extract, Ethylhexyl Methoxycinnamate, Dimethiconol, Cyclopentasiloxane, Polyquaternium-37, Propylene Glycol Dicaprylate/Dicaprate, PPG-1 Trideceth-6, Propylene Glycol, Alcohol, Butylene Glycol, Caprylyl Glycol, Sodium Chloride, Hexylene Glycol, Tetrasodium EDTA, Leuconostoc/Radish Root Ferment Filtrate, DMDM Hydantoin, Diazolidinyl Urea, Iodopropynyl Butylcarbamate, Parfum/Fragrance, Benzyl Benzoate, Linalool, Benzyl Salicylate, Hydroxycitronellal, Limonene, Citronellol, CI 17200/Red 33.



Product details: Jeju Orchid Eye Cream. Full product list
http://www.innisfreeworld.com/product/productSearchList.do

Marketer: Innisfree Corporation, 7th floor, 100, Hangang-daero, Yongsan-gu, Seoul, Korea.

Water, Butylene Glycol, Glycerin, Squalane, Cetyl Ethylhexanoate, Limnanthes Alba (Meadowfoam) Seed Oil, Niacinamide, Copernicia Cerifera (Carnauba) Wax / Copernicia Cerifera Cera/ Cire De Carnauba, Cyclopentasiloxane, Butyrospermum Parkii (Shea) Butter, Glyceryl Stearate, Cyclohexasiloxane, C14-22 Alcohols, Stearic Acid, Arachidyl Alcohol, Palmitic Acid, Cetearyl Alcohol, Peg-100 Stearate, Propanediol, Behenyl Alcohol, Polyacrylate-13, C12-20 Alkyl Glucoside, Arachidyl Glucoside, Fragrance Polyisobutene, Hydrogenated Lecithin, Glyceryl Caprylate, Ethylhexylglycerin, Xanthan Gum, Polyglyceryl-3 Methylglucose Distearate, Disodium Edta, Adenosine, Polysorbate 20, Sorbitan Isostearate, Myristic Acid, Avena Sativa (Oat) Kernel Extract, Caffeine, Hyaluronic Acid, Lauric Acid, Betaine, Glucose, **Orchid Extract,** Phenoxyethanol, Tocopherol.

Trade

CITES trade statistics were compiled from the CITES Trade Database, for the period 2006-2016. It must be noted that this data often contains discrepancies between the exporter and importer reported quantities. Records show that the trade in *Cymbidium* species is all

artificially propagated or for scientific purposes, except for a few records of wild trade, one of which was 9000 live hybrids exported by China to Vietnam, purpose trade, in 2014, which could be misreported. The genus *Cymbidium* is mainly in trade as live plants, tissue cultured plants, dried plants and extracts. The recorded trade in live plants is large (nearly 380 million) and the trade in extracts and dried plants is relatively recent, commencing on a large scale in 2012/13.

Live plants of *Cymbidium* hybrids in a flowering or non-flowering state shipped according to a set of criteria laid out in annotation [10] are not regulated under CITES. Additionally, cut flowers of artificially propagated plants of all orchids (as laid out under point b) annotation #4) are also not regulated under CITES. Reporting of the trade in hybrids is only provided to the level of "Cymbidium hybrid" and does not include specific information on the ancestry/parentage of the hybrids. Live plants, stems, flowers, roots, leaves or cell lines from tissue cultured plants may all be used to produce orchid extracts. There are no known species-specific Harmonised System (HS) tariff codes that would enable tracking import/ (re)export trade of this species. There are specific codes for live, raw, semi-processed or processed products of orchids or products likely to contain orchids. This genus is in trade via the Internet and as seed.

A point of interest in trade patterns is the trade in Asia, particularly between the Republic of Korea**,** PR China and Japan, and Taiwan (PoC) to the Republic of Korea, as Japan and Republic of Korea have extensive cosmetic and personal care industries. Taiwan (PoC) exports large numbers of both live (over 344 million, according to importer recorded exports – around 90% of total exports) and, in 2013, large amounts of dried plants (580,458) to the Republic of Korea; over 18 million live plants are recorded as hybrids, and the dried plants are recorded as *C. sinense, C. goeringii, C. aloifolium* and *C. ensifolium*. In turn the Republic of Korea exports live plants (over 20 million, hybrids and species) worldwide, a substantial amount of cultures to China (3,078,600) and is the exclusive exporter of extracts, to Japan and China. France imports both live plants, (mainly from Thailand), and dried plants and cultures (mainly from Taiwan (PoC) and Republic of Korea). Japan both imports and exports live plants (hybrids and species) and since 2012 has begun importing extracts from the Republic of Korea (46,063). The US have imported almost 6 million live plants in the ten year period, nearly all from the Republic of Korea, which can be used to produce orchid extracts but no data is available on US exports of these extracts. Two large chemical companies in the US, Ashland and United Guardian, produce 'Cymbidium grandiflorum extract'.

Live plants

Virtually all trade in live plants of *Cymbidium* species is in artificially propagated specimens. There is a huge discrepancy between the amount reported by the importer (378,129,974 plants) and the exporter (49,476,976 plants), probably due to the reporting requirements of

Taiwan (PoC). The main exporter is Taiwan (PoC) and Republic of Korea is the largest importer.

While the majority of live plants in trade appear destined for the horticultural industry, the fact that parts of live plants can be used for extraction purposes and some of the importing countries are home to large cosmetic manufacturing companies suggests that this trade could supply material for the production of *Cymbidium* extracts included in finished cosmetic products.

Tissue cultured plants

Table 1shows that trade in artificially propagated tissue cultured plants is comparatively new, commencing in 2008, and is mainly from Republic of Korea to China with a few exceptions as shown in table. France, a major producer of extracts for the cosmetic and personal care market, imported over 14,000 cultures between 2010-16; these could be used to manufacture extracts to be used in cosmetic products.

Table 1

Year	Taxon	Importer	Exporter	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2008	Cymbidium spp.	US	AU		210	cultures		T	A
2009	Cymbidium spp.	CA	AU	51	51	cultures		T	A
2009	Cymbidium atropurpureum	US	PH		3	cultures		T	A
2009	Cymbidium hybrid	CN	KR		710100	cultures		T	A
2009	Cymbidium hybrid	KR	TW	40000		cultures		T	A
2009	Cymbidium hybrid	TH	KR		7500	cultures		T	A
2009	Cymbidium hybrid	US	FR		15	cultures		P	A
2009	Cymbidium hybrid	US	KR		5300	cultures		T	A
2010	Cymbidium aloifolium	AU	TH	5		cultures		T	A
2010	Cymbidium ensifolium	AU	TH	10		cultures		T	A
2010	Cymbidium spp.	AU	TW	20		cultures		T	A
2010	Cymbidium spp.	CN	KR		409500	cultures		T	A
2010	Cymbidium spp.	KR	CN	19200		cultures		T	A
2010	Cymbidium aloifolium	FR	TH	20		cultures		T	A
2010	Cymbidium ensifolium	AU	TH	5		cultures		T	A
2010	Cymbidium hybrid	CN	KR		324000	cultures		T	A
2010	Cymbidium hybrid	FR	TH	6583		cultures		T	A
2010	Cymbidium hybrid	US	FR		110	cultures		T	A
2010	Cymbidium sinense	AU	TH	5		cultures		T	A
2011	Cymbidium hybrid	CN	KR		589500	cultures		T	A
2012	Cymbidium spp.	NZ	AU	1		cultures		T	A
2012	Cymbidium hybrid	CN	KR		569000	cultures		T	A
2012	Cymbidium hybrid	FR	TH	10		cultures		T	A
2012	Cymbidium hybrid	PH	AU	120		cultures		B	A
2012	Cymbidium hybrid	US	KR		16000	cultures		T	A

Year	Taxon	Importer	Exporter	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2013	Cymbidium aloifolium	FR	TH	24		cultures		T	A
2013	Cymbidium hybrid	CN	KR		250500	cultures		T	A
2013	Cymbidium hybrid	FR	TH	70		cultures		T	A
2013	Cymbidium lancifolium	FR	TH	16		cultures		T	A
2014	Cymbidium spp.	CN	KR		180000	cultures		T	A
2014	Cymbidium hybrid	FR	TH	30		cultures		T	A
2014	Cymbidium hybrid	FR	TW	1500		cultures		T	A
2015	Cymbidium spp.	CN	KR		46000	cultures		T	A
2015	Cymbidium spp.	US	KR		7000	cultures		T	A
2015	Cymbidium spp.	VN	KR		25820	cultures		T	A
2015	Cymbidium hybrid	FR	TH	720		cultures		T	A
2015	Cymbidium hybrid	FR	TW	1000		cultures		T	A
2015	Cymbidium hybrid	FR	TW	1200		cultures		T	U
2015	Cymbidium hybrid	VN	KR	16600		cultures		T	A
2016	Cymbidium aloifolium	FR	TH	5		cultures		T	A
2016	Cymbidium atropurpureum	FR	TH	10		cultures		T	A
2016	Cymbidium hybrid	FR	CN	2714		cultures		T	A
2016	Cymbidium hybrid	FR	TH	20		cultures		T	A
2016	Cymbidium hybrid	FR	TW	300		cultures		T	A

Raw material

Roots and stems

Trade in roots and stems is low in volume and nearly all from an artificially propagated source.

Table 2

Year	Taxon	Importer	Exporter	Importer reported quantity	Exporter reported quantity	Term	Purpose	Source
2006	Cymbidium spp.	BS	US	2		stems	T	A
2008	Cymbidium spp.	GA	CI		1	roots	P	W
2011	Cymbidium spp.	BS	US	1		stems	T	A
2011	Cymbidium spp.	JP	KR		1579	stems	T	A
2011	Cymbidium spp.	RU	KR		156	stems	T	A

Processed material

The trade in processed material (derivatives, extracts, dried plants, powder) is mainly in *Cymbidium* species, with a small amount in hybrids, and the majority is between Republic of Korea, China, Japan and Taiwan (PoC).

Extracts

Table 3 shows that the trade in extracts is comparatively recent, commencing in 2012. A definition of extract is provided in *Guidelines for the preparation and submission of CITES annual reports (2011*) as "*extract – usually plant extracts*", and in the CITES Glossary as '*any substance obtained directly from plant material by physical or chemical means regardless of the manufacturing process. An extract may be solid (e.g. crystals, resin, fine or coarse particles), semi-solid (e.g. gums, waxes) or liquid (e.g. solutions, tinctures, oil and essential oils)'*. The preferred unit of reporting is in kilograms or alternatively litres. The trade is exclusively exported by Republic of Korea and imported by Japan and China.

Table 3

Year	Taxon	Importer	Exporter	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2012	Cymbidium ensifolium	JP	KR		17298	extract		T	A
2013	Cymbidium spp.	JP	KR		3000	extract		T	A
2013	Cymbidium ensifolium	JP	KR		1155	extract		T	A
2014	Cymbidium spp.	JP	KR		17000	extract		T	A
2014	Cymbidium kanran	CN	KR	40		extract	kg	T	A
2014	Cymbidium kanran	CN	KR		40	extract		T	A
2015	Cymbidium spp.	JP	KR		5004	extract		T	A
2015	Cymbidium kanran	CN	KR	100		extract	kg	T	A
2015	Cymbidium kanran	CN	KR		115	extract		T	A
2016	Cymbidium kanran	CN	KR	155		extract	kg	T	A

Dried Plants

Table 4 shows that trade in dried plants increased substantially in 2013 and the bulk of it is between Taiwan (PoC) and Republic of Korea.

Table 4

Year	Taxon	Importer	Exporter	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2006	Cymbidium spp.	FR	MG		0.2	dried plants	kg	P	W
2006	Cymbidium spp.	FR	MG		1	dried plants		P	W
2012	Cymbidium aloifolium	FR	FR		1	dried plants		T	A
2012	Cymbidium hybrid	FR	FR		1	dried plants		P	A
2013	Cymbidium spp.	KR	TW	476700		dried plants		T	A
2013	Cymbidium aloifolium	KR	TW	36200		dried plants		T	A
2013	Cymbidium ensifolium	KR	TW	11648		dried plants		T	A

2013	Cymbidium goeringii	KR	TW	1000		dried plants		T	A
2013	Cymbidium hybrid	AF	KR		4400	dried plants			A
2013	Cymbidium hybrid	FR	TH	20		dried plants		T	A
2013	Cymbidium sinense	KR	TW	54910		dried plants		T	A
2015	Cymbidium spp.	DE	MM	12		dried plants		S	W
2015	Cymbidium spp.	DK	TH	1		dried plants		S	W
2016	Cymbidium hybrid	FR	MY	24		dried plants		T	A

Derivatives

The CITES definition of a derivative is provided in Notification 2011/019 *Guidelines for the preparation and submission of CITES annual reports* (2011) as "*derivatives (other than those included elsewhere in this table)*" and in the CITES Glossary as "*Any processed part of an animal or plant (e.g. medicine, perfume, watch strap*)". The definition indicates that the product has been processed, but not whether it is a finished product. Table 5 shows the trade in derivatives of *Cymbidium.* The unit of quantity is all but absent (derivatives should be reported in units of kilograms or litres) making it difficult to interpret this trade in terms of assessing its volume. The majority of trade is from artificially propagated material originating in Taiwan (PoC) and imported by Republic of Korea.

Table 5

Year	Taxon	Importer	Exporter	Importer reported quantity	Exporter reported quantity	Term	Unit	Purpose	Source
2009	Cymbidium pendulum	NZ	CN	25		derivatives	g	P	I
2010	Cymbidium spp.	KR	TW	25000		derivatives		T	A
2010	Cymbidium aloifolium	KR	TW	8000		derivatives		T	A
2010	Cymbidium ensifolium	KR	TW	20000		derivatives		T	A
2013	Cymbidium hookerianum	JP	FR		3.72	derivatives		T	A

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Salep: An overview

The trade in terrestrial orchid tubers in Turkey, Iran and Greece

Commissioned by Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

March 2017

Catherine Rutherford and Madeleine Groves

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Executive Summary

Salep refers to dried tubers of terrestrial orchids, ground tuber powder and the beverage made from this powder (Ghorbani *et al.* 2014). Salep drink was popular in the Ottoman Empire and spread to Europe in the late 17th century, known in England as salop or saloop (Davidson, 1999), before the rise of tea and coffee. It is now consumed mainly in Turkey and Greece (Bulpitt, 2005; Ece Tamer et al. 2006; Starin, 2012; Ghorbani et al. 2014). Annual salep production in Turkey is estimated at between 35-40 tons, and requires the harvest of around 40-50 million wild collected orchid plants.

All species of terrestrial orchid with spherical or ellipsoidal tubers are used for salep. The main genera involved are *Orchis*, *Anacamptis*, *Neotinea, Ophrys, Serapias* and *Himantoglossum*; some with digitate or carrot-like tubers are also collected (e.g. *Dactylorhiza, Gymnadenia and Platanthera*). The trade in eastern Mediterranean, Asia Minor and Middle Eastern orchid tubers for salep continues today and is possibly increasing as demand rises. Significant numbers of tubers are collected indiscriminately from the wild and are traded for production of salep tuber powder (Kasparek & Grimm, 1999; Ece Tamer *et al.* 2006; Sandal Erzurumlu & Doran, 2011; Ghorbani *et al.* 2014; Kreziou *et al.* 2015). Harvested tubers are washed in water, boiled in either water or milk, sun- or air-dried and traded as dried tubers (Kasparek & Grimm, 1999). The tubers are then ground into a powder and used to prepare the beverage (Sezik, 2002; Ece Tamer *et al.* 2006; Starin, 2012). The powder is also used as a stabiliser in the manufacture of Dondurma, or Maraş, ice cream, known for its elasticity and resistance to melting.

Studies carried out in 1999 showed that demand for ice cream with the typical salep flavour had decreased and that there were only a few places left in Ankara, Turkey, where ice cream produced with pure salep was still sold (Kasparek & Grimm, 1999). However, salep appears to be enjoying a renewed popularity in the region, driven by consumer demand for traditional, organic and alternative food, with consumers possibly unaware of the conservation risks to threatened species associated with this popularity.

Packaged instant salep was previously considered to contain insignificant amounts of orchid species (Kasparek & Grimm, 1999) but this may not always be the case. A recent study used DNA barcoding and metabarcoding to identify orchid and other plant species present in 55 commercial salep products purchased in Iran, Turkey, Greece and Germany. Twenty one products (42%) contained orchids belonging to 12 terrestrial species with tuberous roots. Separate analysis carried out by the German Management Authority on seven samples of salep powder bought in Germany identified *Dactylorhiza* DNA in five samples, comprising between 0.3-9%.

Reports indicate that tuberous orchids are not only collected from the wild in Turkey, Greece and Iran but also in Syria, Afghanistan, Albania and Lebanon. A study on the conservation risks associated with an increase in wild harvesting in Iran (Ghorbani *et al.* 2014) implies that as orchids in Turkey become scarcer, collection in neighbouring countries

may increase, threatening more populations of orchids. Salep products are present in all countries that have a large Turkish diaspora, and are widely available in Germany, the Netherlands and the UK. Unregulated trade of salep products poses a substantial threat to wild orchids in Greece, Turkey and Iran. (H. de Boer, pers. comm. 2017).

Indian salep is not the same as the Mediterranean variety; salep *misri* sold in the Indian bazaars is derived from various species of *Eulophia* (Teoh, 2016). Concoctions made from tubers are also sold medicinally in India, Nepal and Pakistan and are considered to have aphrodisiac properties. Species and volumes collected for this trade have not been assessed for this report, but appear to be considerable and unsustainable.

Taxonomy

The main genera involved are *Anacamptis, Dactylorhiza, Himantoglossum, Neotinea, Ophrys, Orchis* and *Serapias*. The taxonomy of genera such as *Ophrys* and *Dactylorhiza* is confused with some authorities recognising lots of species based upon often minor morphological differences, whereas others recognise far fewer species based upon genetic evidence, recognising the morphological variation at infraspecific rank, such as subspecies and variety. For *Ophrys,* which is particularly taxonomically complicated, many amateurs and enthusiasts accept over 250 species, while others including some scientists only accept about 30, but with many subspecies and varieties, and numerous natural hybrids. In the 1990s the genus *Orchis* was reduced in scope based upon DNA evidence and some species previously included in it were transferred to *Anacamptis* and *Neotinea* by Pridgeon et al. (1996) (P. Cribb, pers. comm. to C. Rutherford 2017).

Species

All species of terrestrial orchid with spherical or ellipsoidal tubers are used for Salep; some with digitate or carrot-like tubers are also collected (e.g. *Dactylorhiza, Gymnadenia and Platanthera*). Estimates of vulnerable species vary for different countries: seven species in three genera, (*Anacamptis, Dactylorhiza* and *Orchis*) in northern Greece (Kreziou *et al.* 2014); 16 species and subspecies in seven genera in Iran (Ghorbani *et al.* 2014); and 30 species from the genera *Orchis, Anacamptis, Himantoglossum, Ophrys, Serapias* and *Dactylorhiza* in Turkey (Sezik, 1967; 1990; Tekinsen and Guner, 2010). Ece Tamer et al. (2006) report that there are 90 orchid species belonging to 24 genera used in salep production in Turkey, and Kemeç (2015) estimates around 120 orchid species, including the genera *Aceras* (now in *Orchis), Anacamptis, Barlia* (now in *Himantoglossum), Dactylorhiza, Himantoglossum, Neotinea, Ophrys, Orchis* and *Serapias,* in Anatolia.

A list of species from pooled data is included in the **Annex** to this document.

Favoured species

The main species collected for salep have oval or circular tubers varying in size according to genus and species (known as Qolveh-ey (round or oval) Salep in Iran). *Dactylorhiza, Gymnadenia* and *Platanthera* species have a branched or palmate tuber (known as Panĵeh-ey (palmate) salep in Iran). The two types of tubers are recognized by harvesters based on morphology and are also recognized in the market. The oval tuber is reputed to be of a superior quality and fetches a higher price (Ghorbani *et al.* 2014). According to Teoh (2016), the best salep is said to be produced from *Orchis coriophora* Linn.*, O. longicruris* Link*. O. mascula* L.*, O. militaris* L. and *Platanthera bifolia* (L) Rich.

Salep tubers contain a starchy polysaccharide called glucomannan which is used to thicken beverages and add stretch to ice cream. Salep samples obtained from *Dactylorhiza osmanica* var. *osmanica*, *Ophrys mammosa*, *Orchis anatolica*, *Orchis coriophora*, *Orchis italica*, *Anacamptis morio (Orchis morio)*, *Orchis palustris*, *Orchis simia*, *Neotinia tridentata (Orchis tridentata*) and *Serapias vomeracea* ssp. *orientalis* in Anatolia were analyzed for moisture, glucomannan, starch, protein, ash contents, pH and viscosity values. Depending on the species, the samples showed statistically significant differences in glucomannan, starch and viscosity values. Salep samples obtained from the tubers of *Orchis italica*, *Anacamptis morio (O. morio)*, *O. anatolica*, *Neotinia tridentata (O. tridentata)* and *Serapias vomeracea* ssp. *orientalis*, respectively, had higher glucomannan contents and viscosities (Tekinsen and Guner, 2010).

Distribution

Anacamptis: A dozen species distributed in northern, central, and southern Europe, western Asia and south to North Africa. *Anacamptis collina* and *A. pyramidalis* extend east to Iran, and *A. pseudolaxiflora* extends east to Afghanistan and south to Yemen.

Dactylorhiza: About 50 often poorly defined species occurring mostly in boreal, temperate, and less frequently, Mediterranean areas, from Iceland, northern Scandinavia and North Africa east to the Himalayas and Japan, as well as Madeira in the west to Siberia in the east and North America only in the Aleutian Islands.

Eulophia: As it is presently understood, *Eulophia* comprises some 230 species (Thomas, 1998). It is most diverse in tropical and southern Africa. About 40 species are found in Asia, mostly tropical in distribution, but the range of *E. dabia* (D.Don) Hochr. extends into temperate central Asia in Turkestan, Afghanistan, and western China. Many species in the genus are widespread.

Gymnadenia: About 16 species distributed in Europe, central and eastern Asia including China, Japan, and the Himalayan region.

Habenaria: A genus of about 600 species, in tropical and subtropical regions of Old and New World.

Himantoglossum: Four species distributed in western, central, and southern Europe and North Africa, eastwards to Turkey, the Caucasus, and southwest Iran.

Neotinea: Four species distributed from western Ireland and the Isle of Man eastward across southern Europe from Portugal and the Canary Islands to Turkey and the Lebanon, south to north Africa, east to the Caucasus, Iraq, and the Caspian region in western Asia.

Ophrys: A genus of approximately 126 species (Delforge, 1995) distributed throughout Europe from the Canary Isles to the Caspian Sea, from southern Scandinavia south to North Africa, east to western Asia (NE Iran), attaining their greatest diversity in the Mediterranean Basin. The number of species listed by Delforge and others is undoubtedly inflated by the recognition of minor variants at specific rank.

Orchis: About 33 species distributed in Europe, particularly the Mediterranean region, temperate Asia, and north Africa, from the Azores, Madeira, and Canary Islands in the west to Iran and the Caucasus in the east, north as far as Scandinavia.

Platanthera: Approximately 200 species (Luer, 1975) distributed over Europe and North Africa, extending eastward across Asia to New Guinea, North and Central America.

Serapias: An essentially Mediterranean genus of 19 currently recognized species distributed from the Azores and Canary Islands in the west to the Caucasus in the east, south to North Africa and north as far as Brittany in France. *Serapias lingua* was recently recorded from Guernsey in the Channel Islands, and *S. parviflora* has been found in Cornwall, UK.

Source: eMonocot (2010)

Uses

Food/Drink

The tubers are boiled, dried and ground and the resulting powder added to hot milk or water, rice flour /mastic /cornflour, cinnamon, rose water and sugar to create a warm beverage. The powder is also used as stabiliser in Dondurma, or Maraş, ice cream, as it contains glucomannan and starch which increases the elasticity of the ice cream, slows its melting and is said to improve the taste.

It is variously known as salep, sahlep, salepi, sahlab and sachlav.

Medicinal

The tubers have been attributed various medicinal properties over the years. They are used as a remedy for colds, coughing and sore throats and to ease stomach ache and intestinal cramps (Kreziou et al. 2015); to treat infants and children from diarrhoea (Teoh, 2016)); as a general stimulant, expectorant, and remedy for osteoporosis, joint pains, and asthma; and

to treat impotence, especially in men (Ghorbani et al. 2014). Studies undertaken by Faraji et al. (2013) appear to support the latter theory.

Commercially traded forms

Raw material

Both palmate and ovoid tubers are collected from the wild and traded to middlemen direct from the fields, who in turn sell at a profit to merchants who subsequently dry them and sell them.

Freshly collected tubers of *Dactylorhiza sambucina* from Greece (b); tubers of *Dactylorhiza sambucina* left to dry in Distrato (c); dried tubers for home use in a village in Grevena (d). Image copyright Kreziou et al. 2015

(Dried) tuber samples of different morphology purchased from the markets in Iran. (Left) Samples of *Orchis/Anacamptis* type tubers. (Right) Samples of *Dactylorhiza* type tubers. Image copyright Ghorbani et al. 2016.

Processed

Instant, packaged salep is traded globally. The salep is sometimes removed and replaced with artificial flavourings, for instance carboxymethyl-cellulose (CMC, a sort of modified starch having the same viscosity as salep which is thermo-stable when dissolved in water). Other ingredients can include rice flour /mastic /cornflour, milk, sweeteners, rose water, cinnamon, mahleb (a spice made from the kernel of a species of cherry) and 'nature identical' salep, manufactured in a laboratory.

Cultivation

The species of orchids that yield the best salep *(Orchis mascula, O. militaris* and *Anacamptis morio*) can be cultivated (Seaton & Ramsay, 2005; Kreziou et al. 2016), as can *Ophrys mammosa*, *Orchis provincialis, Orchis simia* and *Neotinea tridentata* (Kemeç et al. 2015; Ponert et al. 2011). Mado, a Turkish ice cream brand which has around 300 cafes and restaurants worldwide and manufactures large amounts of ice cream using salep, states on its Greek website that it cultivates its own orchid in plantations, but this has not been verified and no response was received for this report.

A nursery in Belgium (Phytesia) is producing large numbers of these genera (mainly *Orchis* and *Dactylorhiza*), grown mainly for the European cosmetics industry. It provides between 100 - 300 kilos of plants in vitro annually; one kilogram is about 1000 plants in vitro which equates to around 100,000 and 300,000 in vitro plants per year. It is also trialling large scale cultivation of orchids for salep production, including *Anacamptis morio* (*Orchis morio*) and *Orchis mascula*.

Micropropagation of terrestrial orchids. Image copyright: Pascal Lambé, Phytesia

Large scale cultivation of terrestrial orchids. Image copyright: Pascal Lambé, Phytesia

Large scale cultivation of terrestrial orchids. Image copyright: Pascal Lambé, Phytesia

However, no other large scale cultivation of any species of terrestrial orchid harvested for salep could be identified for this report.

Wild Harvesting

Process

Collectors identify orchids by their above-ground appearance and uproot the plants with a shovel. At the time of harvesting, the old tuber, which has already produced a flowering plant, is discarded and the new tuber, which will yield the next year's plant, is selected. The high prices of tubers have led to competition between collectors, and many commence harvesting before the plants bloom and develop seeds, destroying the existing plants and hampering regeneration by preventing seed development; as a result current orchid collection practice is not sustainable (Ghorbani et al. 2014; Kreziou et al. 2015)

According to Ghorbani et al. (2014), local middlemen in Iran buy the tubers directly from villagers and soak the tubers in water until the tuber stock reaches a reasonable weight. They are then packed into bags of 50 – 100 kg and sent to merchants in Western Azerbaijan or Tehran, Iran, on long distance buses to sell on to merchants at a 10-15% profit. Prior to drying, tubers are boiled in either water or milk sometimes with the addition of one or two tablespoons of potassium sulfate (K_2SO_4). The process of boiling removes the bitterness, destroys the vitality of the tubers and facilitates drying. After boiling, the tubers are sieved and rinsed with fresh water, and dried in the sun or in a ventilated room. After drying, the colour changes to yellow or yellowish grey; according to the merchants, the darker the colour of the dried tubers the better the quality of the salep (Ghorbani et al. 2014). In this state they can be stored for long periods (Ercisli & Esitken, 2002; Teoh, 2016). The merchants then sell them on to either wholesalers or traders from Turkey, and to a lesser extent from India and Pakistan (Ghorbani et al. 2014). The livelihoods benefits are significant due to the sizeable profits at each stage of the process, which makes it difficult to replace salep with a synthetic substitute (IUCN, 1996).

In Greece, street vendors interviewed in Thessaloniki stated that they obtained dried, unground orchid tubers from middlemen from neighbouring Albania and Turkey (Kreziou et al. 2015).

Amount

There are no reliable figures for annual salep harvest in Turkey, but estimates range from 30 - 45 tons, which would roughly equate to a harvest of 40 - 50 million plants (IUCN, 1996; Sezik, 2002, 2006). The amount of tubers needed for 1kg dried salep depends on the harvested species and life stage; Kasparek and Grimm (1999) reported different tuber counts per kg of dried salep originating from different parts of Turkey ranging from 4,348 tubers per kg from Muğla region to 625 tubers per kg from Maraş region.

The increasing scarcity of wild orchids in Turkey has forced traders to identify new sources in neighbouring countries. In Iran, where traditionally orchid tubers are hardly consumed, collection has increased substantially. Based on estimates from the 2013 April to June harvest season more than 24.5 tons of fresh tubers was collected from three districts in

Golestan province alone. Early in the season 8–10 kg of fresh tuber yields 1 kg of dried tuber, decreasing to 4-6kg per 1kg of dried tuber towards the end of the season and after flowering (Ghorbani et al. 2014). In this area, 1 kg of dried tubers consists of 1750 ± 93 tubers, which is the number of individual plants that must be harvested to produce 1 kg of ground dried Salep. Other species may differ in size and density, however it is estimated that this amount of tuber requires the destructive harvesting of 5.5 – 6.1 million orchids annually for export from Iran to Turkey, with a market value of 320,000 USD (Ghorbani et al. 2014).

In Syria, the crop was estimated at 1,500,000 orchids per annum twenty years ago (Arnold and Arnold, 1985; IUCN, 1996) but no recent data could be obtained for this study.

Legislation

All species of orchids are listed in CITES Appendix II and permits are required for their trade. All consumer and exporter countries of salep are signatories to this Convention. Through its national legislation project, the CITES Secretariat categorised the national legislation in Greece, Iran and Turkey as legislation that is believed generally to meet the requirements for implementation of CITES (National Legislation Project, 2017).

Turkey

Turkey became a Party to CITES on 23 September 1996 and current legislation, produced by the Ministry of Agriculture and Rural Affairs (MARA) (effective since August 1995), controls the harvesting and export of bulbs through the 'Regulations of Collection, Propagation and Export of Wild Bulbs' published in the Official Gazette. The export of wild orchid tubers was banned on 20 June 1996 following the enactment of "The Agreement on the International Trade of Endangered Wild Animal and Plant Species" published in the Official Gazette Nr. 22672.

Iran

Recent regulation that was passed from the Iranian Forests, Range and Watershed Management Organization (FRWO) to provincial offices on June 12, 2013 (number 92/1/15123) reiterated that all orchid collection is illegal and should be prevented and FRWO offices should not give collection, transport and export permission for orchid tubers (FRWO, 2013). Unfortunately, enforcement of these regulations is not effective enough to prevent destructive collection because of limited tools and resources to monitor and control this trade (Ghorbani et al. 2014). Most of the salep tuber trade from Iran to Turkey takes place without CITES permits, and tubers are often mislabelled as low-value nuts or other products to circumvent taxes and permit requirements (Kasparek & Grimm, 1999; Ghorbani et al. 2014b; Kreziou et al. 2015; Ghorbani et al. 2016).

Greece

All orchids are protected under presidential decree 67/1981, national law 1335/1983, and national law 2005/1992, which enacts CITES.

Conservation status

According to the IUCN Red List, *Anacamptis palustris*, *Dactylorhiza sambucina* and *Orchis simia* have been evaluated as Least Concern but with a population that is decreasing. *Orchis simia* is considered locally threatened and is directly affected by the collection of the tuber for salep (especially in Turkey where the species is considered as endangered) or for horticulture, digging and consumption by animals (wild boar, rabbits, slugs and muntjac), and overgrazing by sheep and goats. *Dactylorhiza baumanniana* and *Dactylorhiza euxina* have been assessed as Near Threatened, and *Dactylorhiza kalopissii* has been assessed as Vulnerable as its habitat has undergone significant declines recently through soil drainage, tourist development, reservoir construction and intensive grazing. Collection of this orchid is a threat to the species. *Orchis sitiaca* has been evaluated as Endangered, with very limited habitat available and it is considered to be potentially threatened due to the difficulties to keep suitable habitats open by grazing. Digging and consumption by animals, tourism and plant collection are also contributing to the decline in numbers (Rankou, 2011).

According to a seven year study, populations of *Ophrys lycia* , *Ophrys sphegodes* subsp. *aesculapii* (*Ophrys climacis*), *Ophrys fusca* (*Ophrys phaseliana*), and *Ophrys isaura* have been seriously damaged in Antalya Province (Deniz, 2013).

Trade

The following commodities may be traded under the following Harmonised System tariff code:

- For orchid tubers (live): 0601203000 (Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage - Orchids, hyacinths, narcissi and tulips https://www.gov.uk/trade-tariff/headings/0601
- For salep (beverage): 0714902010 (Arrowroot, salep and similar roots and tubers with high starch content -) https://www.gov.uk/trade-tariff/headings/0714
- Ice cream: if it contains no milkfats then 2105001000 (Ice cream and other edible ice, whether or not containing cocoa - Containing no milkfats or containing less than 3% by weight of such fats) or if more milk fats then follow the other codes at this link https://www.gov.uk/trade-tariff/headings/2105

Trade data is taken from the CITES Trade Database and covers the years 2006-2016.

Dactylorhiza spp.

The majority of the small live plant trade (7,500-10,500) is in artificially propagated plants from Belgium and the Netherlands. See Table 1 in Trade Data at the end of this report.

There is a very small trade in dried plants, cultures, roots and extracts, the majority exported by the UK. See Table 2 in Trade Data.

Ophrys spp.

All trade apart from three records is imported by Switzerland and is in live and dried plants, derivatives and leaves. See Table 3 in Trade Data.

Orchis spp.

There is a small trade in live plants, the majority in artificially propagated specimens from the Netherlands, Japan and Belgium. See Table 4 in Trade Data. The trade in derivatives, extracts, dried plants and roots is dominated by re-exports from France and Germany, origin Belgium. It appears that this trade is in extracts destined for the cosmetic and personal care industry. Recently, more exports have been recorded from India. See Table 5 in Trade Data.

Other genera

No trade has been recorded for either *Himantoglossum* spp. or *Neotinea* spp. Apart from two records of wild trade for scientific reasons in 2014 from Brazil to Mexico, all the very small trade in *Serapias* spp. is in artificially propagated roots and live plants from Austria to Japan and the USA. There is one record of trade in *Anacamptis* spp. of 24 artificially propagated live plants from Belgium to Switzerland in 2008.

Identification

Limited morphological distinctiveness among salep tubers makes species identification impossible, and it is therefore difficult to establish which species are targeted and affected the most. Morphology-based approaches for identification are insufficient and cannot accurately distinguish dried tubers from different genera. Other methods for salep identification, such as GCMS, HPLC, gravimetric, absorbance and rheological analyses, all indicate that identification to species level is not possible using only chemical analyses (Dogan et al. 2007; Tekinsen & Guner, 2010; Babbar & Singh, 2016, Ghorbani et al. 2016).

Recent research has shown been that molecular identification using DNA barcoding can be used for identification of boiled and dried tubers of orchid species available in Iranian markets. Genomic DNA of sufficient quality could be extracted and sequenced from highly processed salep tubers but post harvest storage and boiling time may affect the quality of extracted DNA. *Dactylorhiza* and *Ophrys*, known for allopolyploidy and hybridization, are challenging for barcoding using the applied markers (Weitemier et al. 2014; Schmickl et al. 2015). The report concluded that species in the genera *Orchis* (34%), *Anacamptis* (27%) and *Dactylorhiza* (19%) were the most common in salep (Ghorbani et al. 2016).

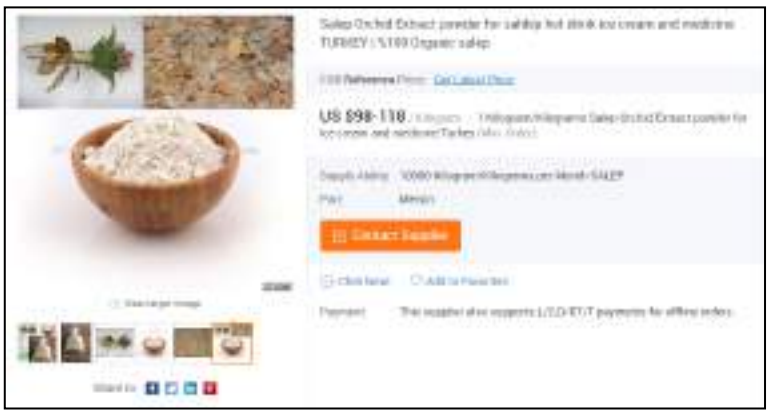
Further research into identification showed that amplicon metabarcoding using the barcoding markers nrITS1 and nrITS2 could identify orchid and other plant species present in commercial salep products. Twenty-one out of fifty samples purchased in Iran, Turkey, Greece, and Germany contained orchids belonging to 12 terrestrial species with tuberous roots. The analysis of interspecific genetic distances between sequences of these markers for the most common salep orchid genera shows that species level identifications can be made with a high level of confidence. Understanding the species diversity and provenance of salep orchid tubers will enable the chain of commercialization of endangered species to be traced back to the harvesters and their natural habitats, and thus allow for targeted efforts to protect or sustainably use wild populations of these orchids (de Boer et al. 2017 – unpublished).

Seven samples of salep powder were tested in Germany and DNA analysis confirmed the presence of *Dactylorhiza* DNA in five of them, ranging from 0.3-9%. Two salep samples were orchid free (Saray Sütlü Sahlep, Kenton Salep ekspres) (I. Kahl (2017) pers. comm. to C. Rutherford).

Manufacturers

Salep powder appears to be widely available online and in countries with a large Turkish diaspora. Exported from Greece, the Lebanon and Turkey, often by multinationals like Nestle (who list both 'salep aroma' and 'salep powder' as ingredients) and Dr Oetker (who list pre-cooked salep as an ingredient). Due to the multitude of products, no manufacturers were contacted.

It is widely available in bulk on the internet (alibaba.com) and in Turkish shops in Europe.



There were five varieties to choose from in one Turkish shop in Hackney, London.

Most products available online state that they contain ‘Roots of *Orchis*’:

Some list ‘salep aroma’ in the ingredient list.

Some list both salep aroma and salep powder, in small percentages (0.3%)

Some state the salep used is ‘nature identical’ i.e chemically manufactured in a laboratory

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Annex

ORCHIDS USED IN SALEP PRODUCTION - 13 genera 78 species

1. *Anacamptis collina*
2. *Anacamptis coriophora*
3. *Anacamptis laxiflora* syn. *Orchis laxiflora*
4. *Anacamptis morio* syn. *O.morio*
5. *Anacamptis morio* subsp*. picta*
6. *Anacamptis palustris* (Jacq.) R.M.Bateman & Pridgeon & Chase
7. *Anacamptis papilionacea* (L.) R.M.Bateman, Pridgeon & M.W.Chase
8. *Anacamptis pyramidalis* (L.) Rich.
9. *Dactylorhiza baumanniana* J.Hölzinger & Künkele
10. *Dactylorhiza cordigera* (Fr.) Soó
11. *Dactylorhiza euxina* (Nevski) Czerep.
12. *Dactylorhiza hatagirea*
13. *Dactylorhiza iberica*
14. *Dactylorhiza incarnata* syn. *Orchis latifolia*
15. *Dactylorhiza kalopissii*
16. *Dactylorhiza maculata* syn. *Orchis maculata*
17. *Dactylorhiza osmanica*
18. *Dactylorhiza saccifera*
19. *Dactylorhiza sambucina* (L.) Soó
20. *Dactylorhiza romana* syn. *Orchis romana*
21. *Dactylorhiza romana subsp.Georgica*
22. *Dactylorhiza umbrosa*
23. *Eulophia campestris*
24. *Eulophia dabia*
25. *Eulophia herbacea*
26. *Eulophia spectabilis*
27. *Eulophia virens*
28. *Gymnadenia orchidis* Lindl.
29. *Gymnadenia conopsea*
30. *Habenaria commelinifolia*
31. *Habenaria pectinata*
32. *Himantoglossum affine*
33. *Himantoglossum comperianum* syn. *Comperia comperianum*
34. *Himantoglossum robertianum* (Loisel.) P.Delforge syn. *Barlia robertiana*
35. *Neotinea maculata*
36. *Neotinea tridentata*
37. *Neotinia ustulata* syn. *Orchis ustulata*
38. *Ophrys apifera* Huds. Syn. *Ophrys holoserica*
39. *Ophrys bombyliflora*
40. *Ophrys cilicica* Schltr.
41. *Ophrys ferrum-equinum* Desq.

42. *Ophrys fuciflora* subsp. *bornmuelleri* (M.Schulze) B.Willing & E.Willing syn. *Ophrys carduchorum*
43. *Ophrys fusca* Link. Syn. *Ophrys phaseliana*
44. *Ophrys isaura* Renz&Taubenheim
45. *Ophrys lutea* Cav.
46. *Ophrys lycia* Renz & Taubenheim
47. *Ophrys mammosa*
48. *Ophrys schulzei* Bornm. & H.Fleischm.
49. *Ophrys scolopax* Cav.
50. *Ophrys sphegodes* syn. *Ophrys fucifera*
51. *Ophrys sphegodes* subsp. *aesculapii* (Renz) Soó ex J.J.Wood syn *Ophrys climacis*
52. *Ophrys sphegodes subsp. mammosa* syn. *Ophrys amanensis*
53. *Ophrys umbilicata* Desf. *Ophrys khuzestanica*
54. *Orchis adenocheila*
55. *Orchis anatolica*
56. *Orchis anthropophora* syn. *Aceras anthropophorum*
57. *Orchis coriophora* Linn.
58. *Orchis mascula*
59. *Orchis militaris*
60. *Orchis italica* Poir. Syn *Orchis longicruris* Link.
61. *Orchis indica*
62. *Orchis pallens*
63. *Orchis palustris*
64. *Orchis pinetorum*
65. *Orchis provincialis*
66. *Orchis punctulata*
67. *Orchis purpurea*
68. *Orchis sancta*
69. *Orchis simia*
70. *Orchis sitiaca*
71. *Orchis spitzelii*
72. *Platanthera bifolia*
73. *Platanthera chlorantha*
74. *Serapias laxiflora*
75. *Serapias orientalis*
76. *Serapias vomeracea*
77. *Steveniella satyrioides*
78. *Zeucrine strateumatica*

Species marked in blue are used in India, Pakistan and Nepal.

Trade Data

Table 1: Trade in *Dactylorhiza* live plants

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Purpose	Source
2006	*Dactylorhiza* spp.	CH	NL		18		live	T	A
2006	*Dactylorhiza* spp.	US	CA			3	live	T	A
2006	*Dactylorhiza foliosa*	US	CA			1	live	T	A
2006	*Dactylorhiza maculata*	AU	BE			9	live	T	A
2006	*Dactylorhiza sambucina*	CH	DE		2		live	T	A
2007	*Dactylorhiza* spp.	CH	BE			264	live	T	A
2007	*Dactylorhiza* spp.	CH	NL		143		live	T	A
2007	*Dactylorhiza* spp.	MY	BE			24	live	T	A
2007	*Dactylorhiza* spp.	RU	CA			4	live	T	A
2007	*Dactylorhiza* spp.	US	CA			19	live	T	A
2007	*Dactylorhiza foliosa*	US	CA			5	live	T	A
2007	*Dactylorhiza fuchsii*	CH	BE			24	live	T	A
2007	*Dactylorhiza fuchsii*	RU	CA			2	live	T	A
2007	*Dactylorhiza fuchsii*	US	CA			7	live	T	A
2007	*Dactylorhiza maculata*	CH	BE			72	live	T	A
2007	*Dactylorhiza maculata*	MY	BE			24	live	T	A
2007	*Dactylorhiza majalis*	CH	BE			24	live	T	A
2008	*Dactylorhiza* spp.	CH	BE		165	165	live	T	A
2008	*Dactylorhiza* spp.	CH	GB	AT	1		live	T	A
2008	*Dactylorhiza* spp.	CH	NL		24		live	T	A
2008	*Dactylorhiza* spp.	GB	JP		10		live	T	A
2008	*Dactylorhiza fuchsii*	AU	AT		3		live	T	A
2008	*Dactylorhiza fuchsii*	CH	BE		63	63	live	T	A
2008	*Dactylorhiza fuchsii*	CH	NL		11		live	T	A
2008	*Dactylorhiza incarnata*	AU	AT		3		live	T	A
2008	*Dactylorhiza incarnata*	CH	BE		48	60	live	T	A
2008	*Dactylorhiza incarnata*	CH	NL		12		live	T	A
2008	*Dactylorhiza*	CH	BE		63	63	live	T	A

	maculata								
2008	*Dactylorhiza maculata*	CH	NL		69		live	T	A
2008	*Dactylorhiza maculata*	FI	CA		400	400	live	T	A
2008	*Dactylorhiza maculata*	US	CA			50	live	T	A
2008	*Dactylorhiza majalis*	CH	BE		63	87	live	T	A
2008	*Dactylorhiza majalis*	CH	NL		24		live	T	A
2009	*Dactylorhiza* spp.	CH	BE		20	35	live	T	A
2009	*Dactylorhiza* spp.	CH	DE		99		live	T	A
2009	*Dactylorhiza* spp.	CH	NL		19		live	T	A
2009	*Dactylorhiza* spp.	CH	NL			1096	live		A
2009	*Dactylorhiza* spp.	GB	CA		35	190	live	T	A
2009	*Dactylorhiza* spp.	GB	JP		50		live	T	A
2009	*Dactylorhiza* spp.	RU	BE			40	live	T	A
2009	*Dactylorhiza* spp.	US	CA			313	live	T	A
2009	*Dactylorhiza fuchsii*	CH	BE		10	10	live	T	A
2009	*Dactylorhiza maculata*	CH	BE		10	10	live	T	A
2009	*Dactylorhiza maculata*	CH	NL		32		live	T	A
2009	*Dactylorhiza maculata*	FI	CA		120	120	live	T	A
2009	*Dactylorhiza maculata*	GB	CA		49	209	live	T	A
2009	*Dactylorhiza maculata*	US	CA			252	live	T	A
2009	*Dactylorhiza majalis*	CH	BE		10	10	live	T	A
2009	*Dactylorhiza majalis*	CH	NL		1095		live	T	A
2009	*Dactylorhiza majalis*	FI	CA		120	120	live	T	A
2009	*Dactylorhiza majalis*	GB	CA		100	300	live	T	A
2009	*Dactylorhiza majalis*	US	CA			10	live	T	A
2010	*Dactylorhiza* spp.	CH	NL		570		live	T	A
2010	*Dactylorhiza* spp.	GB	JP		33		live	T	A
2010	*Dactylorhiza* spp.	US	CA			22	live	T	A
2010	*Dactylorhiza foliosa*	US	CA			12	live	T	A
2010	*Dactylorhiza majalis*	US	CA			10	live	T	A
2011	*Dactylorhiza* spp.	BE	JP		3		live	P	A
2011	*Dactylorhiza* spp.	CH	NL		523		live	T	A
2011	*Dactylorhiza* spp.	DE	JP		25		live	T	A
2011	*Dactylorhiza* spp.	GB	JP		42		live	T	A

2011	*Dactylorhiza* hybrid	US	TH			2	live	T	A
2011	*Dactylorhiza majalis*	GG	BE		5000		live	T	A
2012	*Dactylorhiza* spp.	BE	JP		5		live	P	A
2012	*Dactylorhiza* spp.	CH	DE		160		live	T	A
2012	*Dactylorhiza* spp.	CH	NL		90		live	T	A
2012	*Dactylorhiza* spp.	CZ	JP		1		live	T	A
2012	*Dactylorhiza* spp.	US	BE			10	live	T	A
2012	*Dactylorhiza majalis*	CH	DE		10		live	T	A
2012	*Dactylorhiza majalis*	GU	BE			2710	live	T	A
2013	*Dactylorhiza* spp.	CH	BE		100	100	live	T	A
2013	*Dactylorhiza* spp.	CH	DE		15		live	T	A
2013	*Dactylorhiza* spp.	CH	NL		27		live	T	A
2013	*Dactylorhiza alpestris*	NO	BE			10	live	T	A
2013	*Dactylorhiza fuchsii*	CH	BE		70	70	live	T	A
2013	*Dactylorhiza maculata*	CH	BE		100	100	live	T	A
2013	*Dactylorhiza majalis*	CH	BE		100	100	live	T	A
2013	*Dactylorhiza majalis*	NO	BE			10	live	T	A
2014	*Dactylorhiza* spp.	CH	DE		40		live	T	A
2014	*Dactylorhiza* spp.	CH	JP		5		live	T	A
2014	*Dactylorhiza* spp.	CH	NL			4	live		A
2014	*Dactylorhiza* spp.	DE	JP		750		live	T	A
2014	*Dactylorhiza* spp.	NO	BE			13	live	T	A
2014	*Dactylorhiza foliosa*	CH	DE		20		live	T	A
2014	*Dactylorhiza fuchsii*	NO	BE			1	live	T	A
2014	*Dactylorhiza* hybrid	CH	DE		20		live	T	A
2014	*Dactylorhiza* hybrid	CH	NL		26		live	T	A
2014	*Dactylorhiza maculata*	CH	BE		40	40	live	T	A
2014	*Dactylorhiza maculata*	NO	BE			1	live	T	A
2014	*Dactylorhiza majalis*	CH	BE		20	20	live	T	A
2014	*Dactylorhiza majalis*	CH	DE		15		live	T	A
2014	*Dactylorhiza* majalis	NO	BE			1	live	T	A
2015	*Dactylorhiza* spp.	CH	NL		10		live	T	A
2015	*Dactylorhiza* spp.	CH	NL			10	live		A
2015	*Dactylorhiza* spp.	XX	NL			180	live		A

2015	*Dactylorhiza foliosa*	CH	NL		34		live	T	A
2015	*Dactylorhiza foliosa*	CH	NL			34	live		A
					10745	**7545**			

Table 2: Trade in *Dactylorhiza* derivatives, dried plants, cultures and roots

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Purpose	Source
2007	*Dactylorhiza* spp.	GB	GE			1	dried plants	S	W
2009	*Dactylorhiza foliosa*	NO	GB	AT	2		cultures	T	A
2009	*Dactylorhiza foliosa*	NO	GB	AT		1	roots	T	A
2009	*Dactylorhiza majalis*	NO	GB	BE	2		cultures	T	A
2009	*Dactylorhiza majalis*	NO	GB	BE		1	roots	T	A
2011	*Dactylorhiza* spp.	GB	GE			1	dried plants	S	W
2011	*Dactylorhiza majalis*	GG	BE			5000	roots	T	A
2012	*Dactylorhiza* spp.	GB	JP		30		roots	T	A
2014	*Dactylorhiza fuchsii*	US	FR	BE		47.989	extract	T	A

Table 3: Trade in *Ophrys*

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Purpose	Source
2006	*Ophrys apifera*	CH	DE		1		live	T	A
2008	*Ophrys umbilicata*	IE	JO			1	live	S	W
2010	*Ophrys apifera*	CH	SE		175		live	T	A
2010	*Ophrys sphegodes*	CH	SE		30		live	N	A
2010	*Ophrys sphegodes*	CH	SE		75		live	T	A
2013	*Ophrys spp.*	CH	GR			40	dried plants	S	W
2013	*Ophrys fusca*	CH	GR			160	dried plants	S	W
2014	*Ophrys spp.*	CH	DE		6		live	T	A
2014	*Ophrys kotschyi*	CH	DE		6		live	T	A
2014	*Ophrys lunulata*	CH	DE		6		live	T	A
2014	*Ophrys reinholdii*	CH	DE		6		live	T	A
2014	*Ophrys scolopax*	CH	DE		6		live	T	A
2014	*Ophrys speculum*	CH	DE		6		live	T	A

2015	*Ophrys spp.*	CH	GR			213	derivatives	S	W
2015	*Ophrys spp.*	CH	GR		188		leaves	S	W
2015	*Ophrys spp.*	GB	JO	ZA		1	live		
2015	*Ophrys spp.*	GB	JO			1	live		
2015	*Ophrys apifera*	GB	JO	ZA		1	live		
2015	*Ophrys fusca*	CH	GR	XX	150		leaves	S	W
2015	*Ophrys fusca*	CH	GR			170	derivatives	S	W
2015	*Ophrys fusca*	GB	JO	ZA		1	live		
2015	*Ophrys sphegodes*	GB	JO			1	live		

Table 4: Trade in *Orchis* live plants

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Purpose	Source
2006	*Orchis mascula*	US	CA			2	live	T	A
2006	*Orchis papilionacea*	GB	JO			1	live	S	W
2006	*Orchis patens*	GB	JP			12	live	T	A
2006	*Orchis purpurea*	US	CA			1	live	T	A
2006	*Orchis saccata*	GB	JO			3	live	S	W
2006	*Orchis sancta*	AU	BE			5	live	T	A
2006	*Orchis sancta*	GB	JO			2	live	S	W
2007	*Orchis* spp.	US	JP			125	live	T	A
2008	*Orchis* spp.	BS	TT		10		live	P	A
2008	*Orchis* spp.	GB	JP			20	live	T	A
2008	*Orchis* spp.	UA	NL			28	live		A
2008	*Orchis* spp.	US	JP			240	live	T	A
2008	*Orchis* spp.	US	JP		200		live	T	I
2008	*Orchis morio*	CH	BE		10	10	live	T	A
2008	*Orchis sancta*	IE	JO			1	live	S	W
2009	*Orchis* spp.	CA	JP			25	live	T	A
2009	*Orchis* spp.	NL	JP		100		live	T	A
2009	*Orchis mascula*	JP	BE		50	50	live	T	A
2010	*Orchis* spp.	CA	JP			25	live	T	A
2010	*Orchis* spp.	DE	MX		20		live	T	A
2010	*Orchis* spp.	GB	JP			370	live	T	A
2010	*Orchis* spp.	US	JP			50	live	T	A
2010	*Orchis mascula*	IN	BE			250	live	T	A
2011	*Orchis* spp.	BE	JP			4	live	T	A
2011	*Orchis* spp.	CH	DE		5		live	T	A
2011	*Orchis* spp.	GB	JP			170	live	T	A
2011	*Orchis* spp.	US	JP			25	live	T	A
2012	*Orchis* spp.	BE	JP		2		live	P	A
2012	*Orchis mascula*	IN	BE			250	live	T	A
2013	*Orchis* spp.	CA	JP			25	live	T	A

2013	*Orchis* spp.	FR	JP		25	50	live	T	A
2013	*Orchis* spp.	GB	JP			25	live	T	A
2013	*Orchis* spp.	RU	JP			12	live	T	A
2013	*Orchis* spp.	US	JP			35	live	T	A
2014	*Orchis* spp.	MY	JP			20	live	T	A
2014	*Orchis* spp.	RU	JP			5	live	T	A
2014	*Orchis* spp.	US	JP			28	live	T	A
2015	*Orchis* spp.	SR	NL			80	live		A
2015	*Orchis* hybrid	BB	NL			10	live		A
2015	*Orchis* hybrid	CH	NL			100	live		A
2015	*Orchis* hybrid	KZ	NL			10	live		A
2015	*Orchis* hybrid	NO	NL			212	live		A
2015	*Orchis* hybrid	RS	NL			42	live		A
2015	*Orchis* hybrid	SR	NL			74	live		A
2015	*Orchis* hybrid	TR	NL			190	live		A
2015	*Orchis* hybrid	UA	NL			64	live		A

Table 5: Trade in *Orchis* derivatives, dried plants, roots and extracts

Year	Taxon	Importer	Exporter	Origin	Importer reported quantity	Exporter reported quantity	Term	Purpose	Source
2006	*Orchis coriophora*	PL	UA			1	dried plants	S	O
2006	*Orchis coriophora*	RU	UA			1	dried plants	S	O
2006	*Orchis mascula*	NO	XX		150		derivatives	T	I
2007	*Orchis spp.*	GB	JP			2000	roots	T	A
2007	*Orchis coriophora*	GB	GE			1	dried plants	S	W
2007	*Orchis coriophora*	PL	UA			1	dried plants	S	O
2007	*Orchis coriophora*	RU	UA			1	dried plants	S	O
2007	*Orchis mascula*	GB	PK		5		derivatives		I
2008	*Orchis* spp.	GB	JP			250	roots	T	A
2008	*Orchis mascula*	AR	FR	BE		0.1	extract	T	A
2008	*Orchis mascula*	AU	FR	BE		50	extract	T	A
2008	*Orchis mascula*	CH	DE	BE	0.18		extract	T	A
2008	*Orchis mascula*	CH	FR	BE		10	derivatives	T	A
2008	*Orchis mascula*	CH	FR	BE	10		extract	T	A
2008	*Orchis mascula*	GB	PK		0.02		derivatives		I
2008	*Orchis mascula*	GB	PK		60		derivatives		I
2008	*Orchis mascula*	HR	SI	BE		1.374	derivatives	T	A
2008	*Orchis mascula*	HR	SI	BE	0.43		extract	T	A
2008	*Orchis mascula*	KR	FR	BE		0.3	extract	T	A

2008	*Orchis mascula*	NO	SE			0.699	extract	T	A
2008	*Orchis mascula*	PE	FR	BE		0.4	extract	T	A
2008	*Orchis mascula*	RS	SI	BE		0.63	derivatives	T	A
2008	*Orchis mascula*	RU	DE	BE		3.03	extract	T	A
2008	*Orchis mascula*	RU	FR	BE		50	extract	T	A
2008	*Orchis mascula*	ZA	FR	BE		0.4	extract	T	A
2009	*Orchis* spp.	CA	JP			300	roots	T	A
2009	*Orchis* spp.	GB	JP			1600	roots	T	A
2009	*Orchis* spp.	NL	JP			100	roots	T	A
2009	*Orchis coriophora*	PL	UA			1	dried plants	S	O
2009	*Orchis coriophora*	RU	UA			1	dried plants	S	O
2009	*Orchis mascula*	AD	ES	BE		0.029	extract	T	A
2009	*Orchis mascula*	AE	DE	BE		0.1	extract	T	A
2009	*Orchis mascula*	AR	FR	BE		20.3	extract	T	A
2009	*Orchis mascula*	AU	FR	BE		225	extract	T	A
2009	*Orchis mascula*	AZ	DE	BE		15.55	extract	T	A
2009	*Orchis mascula*	BR	FR	BE		0.3	extract	T	A
2009	*Orchis mascula*	CA	FR	BE		10.3	extract	T	A
2009	*Orchis mascula*	CD	DE	BE		1.62	extract	T	A
2009	*Orchis mascula*	CH	DE	BE	202.46	1847.232	extract	T	A
2009	*Orchis mascula*	CH	DE	BE	0.852		extract	T	A
2009	*Orchis mascula*	CI	DE	BE		22.68	extract	T	A
2009	*Orchis mascula*	CL	FR	BE		0.2	extract	T	A
2009	*Orchis mascula*	CN	DE	BE		0.531	extract	T	A
2009	*Orchis mascula*	CN	FR	BE		300.2	extract	T	A
2009	*Orchis mascula*	CO	DE	BE		0.063	extract	T	A
2009	*Orchis mascula*	CO	FR	BE		52.2	extract	T	A
2009	*Orchis mascula*	DE	CH	BE	720.66		extract	T	A
2009	*Orchis mascula*	DE	CH	BE		0.78	extract	T	A
2009	*Orchis mascula*	EC	FR	BE		30.4	extract	T	A
2009	*Orchis mascula*	FR	FR	BE		1.35	extract	T	A
2009	*Orchis mascula*	HR	SI	BE	2.66	2.02	extract	T	A
2009	*Orchis mascula*	IL	DE	BE		0.21	extract	T	A
2009	*Orchis mascula*	IL	FR	BE		0.7	extract	T	A
2009	*Orchis mascula*	IN	FR	BE		0.4	extract	T	A
2009	*Orchis mascula*	KR	FR	BE		10.8	extract	T	A
2009	*Orchis mascula*	KZ	DE	BE		41.43	extract	T	A
2009	*Orchis mascula*	LV	IN		19286		derivatives		I
2009	*Orchis mascula*	MU	DE	BE		31.8	extract	T	A
2009	*Orchis mascula*	MU	FR	BE		0.1	extract	T	A
2009	*Orchis mascula*	MX	FR	BE		1	extract	T	A
2009	*Orchis mascula*	MY	DE	BE		208.359	extract	T	A
2009	*Orchis mascula*	NO	SE			5.494	extract	T	A

2009	*Orchis mascula*	PE	FR	BE		0.3	extract	T	A
2009	*Orchis mascula*	RS	SI	BE		2.245	extract	T	A
2009	*Orchis mascula*	RU	DE	BE		590.595	extract	T	A
2009	*Orchis mascula*	RU	FR	BE		50.4	extract	T	A
2009	*Orchis mascula*	TH	DE	BE		0.033	extract	T	A
2009	*Orchis mascula*	TN	DE	BE		1292.1	extract	T	A
2009	*Orchis mascula*	TR	DE	BE		3910.697	extract	T	A
2009	*Orchis mascula*	TR	FR	BE		0.1	extract	T	A
2009	*Orchis mascula*	TW	FR	BE		40	extract	T	A
2009	*Orchis mascula*	UA	DE	BE		344.1	extract	T	A
2009	*Orchis mascula*	US	DE	BE		0.033	extract	T	A
2009	*Orchis mascula*	US	FR	BE		526.35	extract	T	A
2010	*Orchis* spp.	GB	JP			1400	roots	T	A
2010	*Orchis mascula*	AR	FR	BE		10	extract	T	A
2010	*Orchis mascula*	AT	IN		300		medicine		I
2010	*Orchis mascula*	AU	FR	BE		100.2	extract	T	A
2010	*Orchis mascula*	BR	FR	BE		0.201	extract	T	A
2010	*Orchis mascula*	CA	FR	BE		0.2	extract	T	A
2010	*Orchis mascula*	CH	DE	BE	107.14	25.92	extract	T	A
2010	*Orchis mascula*	CL	FR	BE		10	extract	T	A
2010	*Orchis mascula*	CO	FR	BE		27.3	extract	T	A
2010	*Orchis mascula*	EC	FR	BE		35	extract	T	A
2010	*Orchis mascula*	FR	FR	BE		0.675	extract	T	A
2010	*Orchis mascula*	ID	FR	BE		0.2	extract	T	A
2010	*Orchis mascula*	IL	FR	BE		0.4	extract	T	A
2010	*Orchis mascula*	IN	FR	BE		0.3	extract	T	A
2010	*Orchis mascula*	IR	FR	BE		0.2	extract	T	A
2010	*Orchis mascula*	JP	IT	FR	0.0174		extract	T	A
2010	*Orchis mascula*	JP	IT			14.395	extract	T	A
2010	*Orchis mascula*	JP	IT			0.003	extract	T	A
2010	*Orchis mascula*	LT	XX		7		extract		I
2010	*Orchis mascula*	MN	DE	BE		7.56	extract	T	A
2010	*Orchis mascula*	MU	DE	BE		34.31	extract	T	A
2010	*Orchis mascula*	MU	FR	BE		0.05	extract	T	A
2010	*Orchis mascula*	MX	FR	BE		75.5	extract	T	A
2010	*Orchis mascula*	MY	DE	BE		18	extract	T	A
2010	*Orchis mascula*	NO	IN		900		extract		I
2010	*Orchis mascula*	NO	SE	BE	1		extract	T	A
2010	*Orchis mascula*	PL	FR	BE		0.4	extract	T	A
2010	*Orchis mascula*	PL	IN	XX	240		derivatives		I
2010	*Orchis mascula*	PL	IN	XX	4672		derivatives		I
2010	*Orchis mascula*	RS	SI	BE		1704	extract	T	A
2010	*Orchis mascula*	RU	DE	BE		124.704	extract	T	A
2010	*Orchis mascula*	SG	FR	BE		0.2	extract	T	A

2010	*Orchis mascula*	TH	FR	BE		1.8	extract	T	A
2010	*Orchis mascula*	TR	DE	BE		51.84	extract	T	A
2010	*Orchis mascula*	TR	FR	BE		76.45	extract	T	A
2010	*Orchis mascula*	TW	FR	BE		21.5	extract	T	A
2010	*Orchis mascula*	UA	DE	BE		86.4	extract	T	A
2010	*Orchis mascula*	US	FR	BE		45.3	extract	T	A
2010	*Orchis mascula*	US	LB		1		extract	T	I
2010	*Orchis mascula*	ZA	FR	BE		0.3	extract	T	A
2010	*Orchis papilionacea*	GB	JO		400		dried plants	S	W
2010	*Orchis papilionacea*	GB	JO			8	dried plants	T	W
2010	*Orchis sancta*	GB	JO			8	dried plants	S	A
2010	*Orchis sancta*	GB	JO		400		seeds	S	W
2011	*Orchis* spp.	GB	JP			2300	roots	T	A
2011	*Orchis mascula*	AR	FR	BE		20	extract	T	A
2011	*Orchis mascula*	CL	FR	BE		30	extract	T	A
2011	*Orchis mascula*	CN	FR	BE		10	extract	T	A
2011	*Orchis mascula*	CO	FR	BE		25	extract	T	A
2011	*Orchis mascula*	EC	FR	BE		10	extract	T	A
2011	*Orchis mascula*	IL	FR	BE		52.2	extract	T	A
2011	*Orchis mascula*	JP	IT	FR	6.61		derivatives	T	A
2011	*Orchis mascula*	JP	IT	FR	2.775		extract	T	A
2011	*Orchis mascula*	JP	IT			9.385	extract	T	A
2011	*Orchis mascula*	MX	FR	BE		25	extract	T	A
2011	*Orchis mascula*	RS	FR	BE		1	extract	T	A
2011	*Orchis mascula*	RU	FR	BE		350	extract	T	A
2011	*Orchis mascula*	TT	FR	BE		0.5	extract	T	A
2011	*Orchis mascula*	TW	FR	BE		540.25	extract	T	A
2011	*Orchis mascula*	US	FR	BE		3434.5	extract	T	A
2012	*Orchis mascula*	AE	IN			4077.36	extract	T	A
2012	*Orchis mascula*	BH	IN			15.39	extract	T	A
2012	*Orchis mascula*	BR	FR	BE		25.5	extract	T	A
2012	*Orchis mascula*	CL	FR	BE		50.6	extract	T	A
2012	*Orchis mascula*	CN	FR	BE		0.2	extract	T	A
2012	*Orchis mascula*	CO	FR	BE		50	extract	T	A
2012	*Orchis mascula*	CY	IN			5186.05	extract	T	A
2012	*Orchis mascula*	EC	FR	BE		30	extract	T	A
2012	*Orchis mascula*	ID	FR	BE		20.5	extract	T	A
2012	*Orchis mascula*	IL	FR	BE		70	extract	T	A
2012	*Orchis mascula*	IN	FR	BE		110.6	extract	T	A
2012	*Orchis mascula*	IQ	IN			1.46	extract	T	A
2012	*Orchis mascula*	JP	FR	BE	0.2	0.2	extract	T	A
2012	*Orchis mascula*	KE	IN			1.03	extract	T	A
2012	*Orchis mascula*	KR	FR	BE		0.4	extract	T	A

2012	*Orchis mascula*	KW	IN			728.11	extract	T	A
2012	*Orchis mascula*	MN	IN			126.31	extract	T	A
2012	*Orchis mascula*	MU	IN			2.74453	extract	T	A
2012	*Orchis mascula*	MX	FR	BE		0.1	extract	T	A
2012	*Orchis mascula*	MY	IN			87.71	extract	T	A
2012	*Orchis mascula*	NG	IN			251.69	extract	T	A
2012	*Orchis mascula*	OM	IN			215.85	extract	T	A
2012	*Orchis mascula*	PE	FR	BE		1.45	extract	T	A
2012	*Orchis mascula*	PL	FR	BE		10	extract	T	A
2012	*Orchis mascula*	QA	IN			56.84	extract	T	A
2012	*Orchis mascula*	RU	FR	BE		0.6	extract	T	A
2012	*Orchis mascula*	TH	FR	BE		10.2	extract	T	A
2012	*Orchis mascula*	TR	FR	BE		0.1	extract	T	A
2012	*Orchis mascula*	TT	FR	BE		25	extract	T	A
2012	*Orchis mascula*	TW	FR	BE		20.25	extract	T	A
2012	*Orchis mascula*	US	FR	BE		4632	extract	T	A
2012	*Orchis mascula*	YE	IN			314.75	extract	T	A
2012	*Orchis morio*	AD	FR	BE		41	derivatives	T	A
2012	*Orchis morio*	AE	FR	BE		249	derivatives	T	A
2012	*Orchis morio*	AU	FR	BE		6	derivatives	T	A
2012	*Orchis morio*	CA	FR	BE		2800	derivatives	T	A
2012	*Orchis morio*	CH	FR	BE		1594	derivatives	T	A
2012	*Orchis morio*	CN	FR	BE		2758	derivatives	T	A
2012	*Orchis morio*	EG	FR	BE		13	derivatives	T	A
2012	*Orchis morio*	IN	FR	BE		41	derivatives	T	A
2012	*Orchis morio*	IQ	FR	BE		198	derivatives	T	A
2012	*Orchis morio*	JO	FR	BE		195	derivatives	T	A
2012	*Orchis morio*	JP	FR	BE	30	2132	derivatives	T	A
2012	*Orchis morio*	KR	FR	BE		2324	derivatives	T	A
2012	*Orchis morio*	KW	FR	BE		80	derivatives	T	A
2012	*Orchis morio*	KZ	FR	BE		95	derivatives	T	A
2012	*Orchis morio*	LB	FR	BE		89	derivatives	T	A
2012	*Orchis morio*	MA	FR	BE		150	derivatives	T	A
2012	*Orchis morio*	MX	FR	BE		17	derivatives	T	A
2012	*Orchis morio*	MY	FR	BE		120	derivatives	T	A
2012	*Orchis morio*	RU	FR	BE		262	derivatives	T	A
2012	*Orchis morio*	SG	FR	BE		153	derivatives	T	A
2012	*Orchis morio*	SN	FR	BE		27	derivatives	T	A
2012	*Orchis morio*	TG	FR	BE		5	derivatives	T	A
2012	*Orchis morio*	TH	FR	BE		64	derivatives	T	A
2012	*Orchis morio*	TN	FR	BE		2	derivatives	T	A
2012	*Orchis morio*	TW	FR	BE		3855	derivatives	T	A
2012	*Orchis morio*	UA	FR	BE		257	derivatives	T	A
2012	*Orchis morio*	US	FR	BE		11246	derivatives	T	A

2012	*Orchis morio*	VN	FR	BE		8	derivatives	T	A
2012	*Orchis morio*	ZA	FR	BE		200	derivatives	T	A
2013	*Orchis* spp.	FR	JP		25		roots	T	A
2013	*Orchis* spp.	KR	JP			630	roots	T	A
2013	*Orchis anatolica*	TR	IE	TR	80		roots	T	W
2013	*Orchis mascula*	AE	IN			6823.2	derivatives	T	A
2013	*Orchis mascula*	AE	IN			185.09	derivatives	T	A
2013	*Orchis mascula*	AU	FR	BE		25	extract	T	A
2013	*Orchis mascula*	BH	IN			42.52	derivatives	T	A
2013	*Orchis mascula*	BR	FR	BE		25.4	extract	T	A
2013	*Orchis mascula*	CH	DE	BE	10000		extract	T	A
2013	*Orchis mascula*	CH	DE	BE		10	extract	T	A
2013	*Orchis mascula*	CH	FR	BE		0.4	extract	T	A
2013	*Orchis mascula*	CL	FR	BE		100	extract	T	A
2013	*Orchis mascula*	CN	FR	BE		1.1	extract	T	A
2013	*Orchis mascula*	CO	FR	BE		25	extract	T	A
2013	*Orchis mascula*	DE	CH	BE	2080	2509	extract	T	A
2013	*Orchis mascula*	EC	FR	BE		0.05	extract	T	A
2013	*Orchis mascula*	ID	FR	BE		75	extract	T	A
2013	*Orchis mascula*	IL	FR	BE		20.9	extract	T	A
2013	*Orchis mascula*	IN	FR	BE		60.4	extract	T	A
2013	*Orchis mascula*	IQ	IN			27.54	derivatives	T	A
2013	*Orchis mascula*	IR	FR	BE		0.2	extract	T	A
2013	*Orchis mascula*	JO	IN			215.75	derivatives	T	A
2013	*Orchis mascula*	KW	IN			360.13	derivatives	T	A
2013	*Orchis mascula*	MN	IN			4.66	derivatives	T	A
2013	*Orchis mascula*	MX	FR	BE		0.4	extract	T	A
2013	*Orchis mascula*	MX	FR		0.25		extract	T	A
2013	*Orchis mascula*	MY	FR	BE		0.1	extract	T	A
2013	*Orchis mascula*	MY	IN			150.56	derivatives	T	A
2013	*Orchis mascula*	OM	IN			71.2	derivatives	T	A
2013	*Orchis mascula*	OM	IN			101.96	derivatives	T	A
2013	*Orchis mascula*	QA	IN			46.98	derivatives	T	A
2013	*Orchis mascula*	RS	FR	BE		0.1	extract	T	A
2013	*Orchis mascula*	RU	FR	BE		60.6	extract	T	A
2013	*Orchis mascula*	RU	IN			66.18	derivatives	T	A
2013	*Orchis mascula*	TW	FR	BE		71	extract	T	A
2013	*Orchis mascula*	UG	IN			1.03	derivatives	T	A
2013	*Orchis mascula*	US	FR	BE		775	extract	T	A
2013	*Orchis mascula*	US	FR	BE		4601	extract	T	A
2013	*Orchis mascula*	XX	IN			934.57	derivatives	T	A
2013	*Orchis morio*	AD	FR	BE		27	derivatives	T	A
2013	*Orchis morio*	AD	FR	BE		73	derivatives	T	A
2013	*Orchis morio*	AE	FR	BE		676	derivatives	T	A

2013	*Orchis morio*	AU	FR	BE		18	derivatives	T	A
2013	*Orchis morio*	AU	FR	BE		318	derivatives	T	A
2013	*Orchis morio*	CA	FR	BE		158.4	derivatives	T	A
2013	*Orchis morio*	CA	FR	BE		1422	derivatives	T	A
2013	*Orchis morio*	CH	FR	BE		920	derivatives	T	A
2013	*Orchis morio*	CN	FR	BE		704	derivatives	T	A
2013	*Orchis morio*	EG	FR	BE		621	derivatives	T	A
2013	*Orchis morio*	EG	FR	BE		92	derivatives	T	A
2013	*Orchis morio*	IN	FR	BE		66	derivatives	T	A
2013	*Orchis morio*	JO	FR	BE		336	derivatives	T	A
2013	*Orchis morio*	JP	FR	BE		2248	derivatives	T	A
2013	*Orchis morio*	KE	FR	BE		111	derivatives	T	A
2013	*Orchis morio*	KR	FR	BE		816	derivatives	T	A
2013	*Orchis morio*	KR	FR	BE		1072	derivatives	T	A
2013	*Orchis morio*	KW	FR	BE		1020	derivatives	T	A
2013	*Orchis morio*	MA	FR	BE		141	derivatives	T	A
2013	*Orchis morio*	MX	FR	BE		161	derivatives	T	A
2013	*Orchis morio*	MY	FR	BE		196.2	derivatives	T	A
2013	*Orchis morio*	MY	FR	BE		344	derivatives	T	A
2013	*Orchis morio*	RU	FR	BE		81	derivatives	T	A
2013	*Orchis morio*	RU	FR	BE		60	derivatives	T	A
2013	*Orchis morio*	SG	FR	BE		51.6	derivatives	T	A
2013	*Orchis morio*	SG	FR	BE		180	derivatives	T	A
2013	*Orchis morio*	TH	FR	BE		263	derivatives	T	A
2013	*Orchis morio*	TN	FR	BE		230	derivatives	T	A
2013	*Orchis morio*	TW	FR	BE		603	derivatives	T	A
2013	*Orchis morio*	TW	FR	BE		4704	derivatives	T	A
2013	*Orchis morio*	UA	FR	BE		345	derivatives	T	A
2013	*Orchis morio*	UA	FR	BE		128	derivatives	T	A
2013	*Orchis morio*	US	FR	BE		3.39	derivatives	T	A
2013	*Orchis morio*	US	FR	BE		2016	derivatives	T	A
2013	*Orchis morio*	US	FR	BE		14166	derivatives	T	A
2013	*Orchis morio*	VN	FR	BE		674	derivatives	T	A
2013	*Orchis morio*	ZA	FR	BE		157	derivatives	T	A
2014	*Orchis* spp.	NL	JP		10200		roots	T	A
2014	*Orchis* spp.	US	JP			500	roots	T	A
2014	*Orchis mascula*	AE	IN			1260.11	extract	T	A
2014	*Orchis mascula*	BR	FR	BE		25	extract	T	A
2014	*Orchis mascula*	CN	FR	BE		11.7	extract	T	A
2014	*Orchis mascula*	CO	FR	BE		25.75	extract	T	A
2014	*Orchis mascula*	DE	CH	BE	518		extract	T	A
2014	*Orchis mascula*	EC	FR	BE		10.35	extract	T	A
2014	*Orchis mascula*	ID	FR	BE		200.3	extract	T	A
2014	*Orchis mascula*	IL	FR	BE		51.3	extract	T	A

2014	*Orchis mascula*	IN	FR	BE		130	extract	T	A
2014	*Orchis mascula*	LV	IN			15420.81	extract	T	A
2014	*Orchis mascula*	LV	IN			14994	extract		A
2014	*Orchis mascula*	MX	FR		0.15		extract	T	A
2014	*Orchis mascula*	MY	IN			9.1	derivatives	T	A
2014	*Orchis mascula*	MY	IN			25.27	extract	T	A
2014	*Orchis mascula*	OM	IN			350.13	extract	T	A
2014	*Orchis mascula*	PE	FR	BE		10.3	extract	T	A
2014	*Orchis mascula*	RU	FR	BE		95.05	extract	T	A
2014	*Orchis mascula*	TW	FR	BE		50.75	extract	T	A
2014	*Orchis mascula*	US	FR	BE		4347	extract	T	A
2014	*Orchis morio*	AD	FR	BE		19.8	derivatives	T	A
2014	*Orchis morio*	AE	FR	BE		935.4	derivatives	T	A
2014	*Orchis morio*	AU	FR	BE		39	derivatives	T	A
2014	*Orchis morio*	CA	FR	BE		2707.8	derivatives	T	A
2014	*Orchis morio*	CH	FR	BE		115.2	derivatives	T	A
2014	*Orchis morio*	CN	FR	BE		1.332	derivatives	T	A
2014	*Orchis morio*	CN	FR	BE		1839	derivatives	T	A
2014	*Orchis morio*	EG	FR	BE		1624.8	derivatives	T	A
2014	*Orchis morio*	IN	FR	BE		1392	derivatives	T	A
2014	*Orchis morio*	IQ	FR	BE		72	derivatives	T	A
2014	*Orchis morio*	IR	FR	BE		658.2	derivatives	T	A
2014	*Orchis morio*	JO	FR	BE		61.8	derivatives	T	A
2014	*Orchis morio*	JP	FR	BE		312	derivatives	T	A
2014	*Orchis morio*	KE	FR	BE		492.6	derivatives	T	A
2014	*Orchis morio*	KR	FR	BE		3830.4	derivatives	T	A
2014	*Orchis morio*	LB	FR	BE		72	derivatives	T	A
2014	*Orchis morio*	MA	FR	BE		853.6	derivatives	T	A
2014	*Orchis morio*	MN	FR	BE		80.4	derivatives	T	A
2014	*Orchis morio*	MX	FR	BE		450	derivatives	T	A
2014	*Orchis morio*	MY	FR	BE		1050	derivatives	T	A
2014	*Orchis morio*	RU	FR	BE		1.315	derivatives	T	A
2014	*Orchis morio*	RU	FR	BE		982.2	derivatives	T	A
2014	*Orchis morio*	SG	FR	BE		774.12	derivatives	T	A
2014	*Orchis morio*	SN	FR	BE		24	derivatives	T	A
2014	*Orchis morio*	TH	FR	BE		27	derivatives	T	A
2014	*Orchis morio*	TH	FR	BE		6	derivatives	T	A
2014	*Orchis morio*	TN	FR	BE		558	derivatives	T	A
2014	*Orchis morio*	TW	FR	BE		528	derivatives	T	A
2014	*Orchis morio*	UA	FR	BE		351.6	derivatives	T	A
2014	*Orchis morio*	US	FR	BE		2.649	derivatives	T	A
2014	*Orchis morio*	US	FR	BE		12282	derivatives	T	A
2014	*Orchis morio*	VN	FR	BE		237.6	derivatives	T	A
2014	*Orchis morio*	ZA	FR	BE		240	derivatives	T	A

2015	*Orchis mascula*	BR	FR	BE		25.2	extract	T	A
2015	*Orchis mascula*	CH	FR	BE		50	extract	T	A
2015	*Orchis mascula*	CN	FR	BE		110.6	extract	T	A
2015	*Orchis mascula*	CO	FR	BE		25.2	extract	T	A
2015	*Orchis mascula*	IL	FR	BE		55	extract	T	A
2015	*Orchis mascula*	IN	FR	BE		120.2	extract	T	A
2015	*Orchis mascula*	JP	FR	BE		0.3	extract	T	A
2015	*Orchis mascula*	RS	FR	BE		0.1	extract	T	A
2015	*Orchis mascula*	RU	FR	BE		60.3	extract	T	A
2015	*Orchis mascula*	TH	FR	BE		0.2	extract	T	A
2015	*Orchis mascula*	TW	FR	BE		180.25	extract	T	A
2015	*Orchis mascula*	US	FR	BE		4950.2	extract	T	A
2015	*Orchis morio*	AE	FR	BE		98.7	derivatives	T	A
2015	*Orchis morio*	AU	FR	BE		33.6	derivatives	T	A
2015	*Orchis morio*	CA	FR	BE		330.66	derivatives	T	A
2015	*Orchis morio*	CA	FR	BG		34.2	derivatives	T	A
2015	*Orchis morio*	CH	FR	BE		158.16	derivatives	T	A
2015	*Orchis morio*	CI	FR	BE		33.84	derivatives	T	A
2015	*Orchis morio*	CN	FR	BE		156	derivatives	T	A
2015	*Orchis morio*	EG	FR	BE		291.9	derivatives	T	A
2015	*Orchis morio*	GE	FR	BE		4.14	derivatives	T	A
2015	*Orchis morio*	IN	FR	BE		102.3	derivatives	T	A
2015	*Orchis morio*	IR	FR	BE		147.06	derivatives	T	A
2015	*Orchis morio*	JO	FR	BE		66.66	derivatives	T	A
2015	*Orchis morio*	JP	FR	BE		252.72	derivatives	T	A
2015	*Orchis morio*	KR	FR	BE		186.03	derivatives	T	A
2015	*Orchis morio*	KW	FR	BE		82.32	derivatives	T	A
2015	*Orchis morio*	KZ	FR	BE		19.8	derivatives	T	A
2015	*Orchis morio*	LB	FR	BE		8.1	derivatives	T	A
2015	*Orchis morio*	MA	FR	BE		83.232	derivatives	T	A
2015	*Orchis morio*	MA	FR	FR		0.2	derivatives	T	A
2015	*Orchis morio*	MX	FR	BE		119.19	derivatives	T	A
2015	*Orchis morio*	MY	FR	BE		47.82	derivatives	T	A
2015	*Orchis morio*	RU	FR	BE		134.16	derivatives	T	A
2015	*Orchis morio*	SG	FR	BE		69.72	derivatives	T	A
2015	*Orchis morio*	SN	FR	BE		6.18	derivatives	T	A
2015	*Orchis morio*	TH	FR	BE		10.5	derivatives	T	A
2015	*Orchis morio*	TW	FR	BE		100.5	derivatives	T	A
2015	*Orchis morio*	UA	FR	BE		29.34	derivatives	T	A
2015	*Orchis morio*	US	FR	BE		2117.52	derivatives	T	A
2015	*Orchis morio*	VN	FR	BE		60.3	derivatives	T	A
2015	*Orchis morio*	ZA	FR	BE		63.6	derivatives	T	A

Chikanda: An Overview

Regional trade in edible terrestrial orchids in Africa

Commissioned by Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

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Executive Summary

Chikanda, also known as kinaki, kikanda or African polony, is a meatless 'cake' made of pounded groundnuts (peanuts) and the tubers of at least three genera of terrestrial orchids. A traditional dish consumed in Zambia and Tanzania for decades, its increasing popularity has led to a dramatic and unsustainable rise in harvesting these orchids from the wild. Zambia is by far the major consumer of this dish and the scarcity of wild orchids in Zambia due to overharvesting has forced traders to identify new sources in adjacent countries.

The majority of orchid tubers used for chikanda in Zambia now come from abroad, principally from the southern highlands of Tanzania but also from Angola, Democratic Republic of Congo (DRC), Malawi and Mozambique. These are mainly countries in which local consumption was taking place at a very small scale, but in which the Zambian demand has led to commercialized trade (Davenport and Ndangalasi, 2003). Consumption of chikanda also appears to be on the increase within Tanzania (Veldman et al. 2014). All trade is imported by Zambia, with the vast majority exported by Tanzania and is mainly in unpackaged raw tubers. There also seems to be some trade in ground powder and prepared 'cake', brought over the border from Tanzania, DRC and Malawi. Recent reports indicate that around 5 million tubers are imported annually by Zambia, from neighbouring countries. The trade appears to be large and unregulated, lacking CITES permits and with no enforcement of CITES regulations.

In comparison to orchid species used in the fragrance, cosmetic and personal care and other food industries chikanda is unprocessed, unpackaged and traded directly from the wild to the market. The orchids are unsustainably harvested and the trade appears to be large and unregulated, lacking CITES permits and enforcement of CITES regulations.

Taxonomy

Traditionally, chikanda was made from species of the genera *Disa, Habenaria* and *Satyrium*, but species of *Brachycorythis*, *Eulophia* and *Roeperochalis* are also thought to be collected for this trade due to overharvesting of the preferred species.

Brachycorythis Lindl. is a genus of 30-35 species of terrestrial herbs up to 1 m. in height, with tuberous roots.

Disa P.J.Bergius is a genus of terrestrial herb with tuberous roots and comprises about 162 species.

Eulophia R.Br. ex Lindl. is a genus of 230 species of small, medium or large terrestrial or rarely lithophytic herbs with perennating organs stem-like, pseudobulbous or tuber-like, above the ground or more commonly underground.

Habenaria Willd. is a genus of about 600 species of terrestrial, rarely epiphytic, herbs with hairy tubers or long fleshy roots.

Roeperocharis Rchb.f. is a genus of five species of terrestrial herb with tuberous roots.

Satyrium SW. is a genus of 88 species of slender or robust terrestrial herbs with ovoid or elongate root tubers.

Species

Increasingly, more species seem to be used in the preparation of this dish, as over collection has caused traditionally less preferred orchids to be targeted. Bingham (2003) reported that *Brachycorythis* species had newly appeared on the market; recent surveys have shown that their trade is now established (S. Veldman, pers. comm. to C. Rutherford 2017).

See **Annex A** for the current list of species thought to be collected for chikanda production, provided by Dr Sarina Veldmann at Uppsala University.

Distribution

Brachycorythis species mainly occur in tropical and South Africa, but with a few species from Madagascar and tropical and subtropical Asia across to Taiwan. They grow in a variety of habitats that are usually quite wet including marshy/ boggy grassland, grassy swamps, damp pastures, marshes in forests, seepage areas among rocks, riverine forest and rainforest, wet (or dry) dambo, and scrubby, deciduous and *Brachystegia* (Fabaceae) woodland.

Disa species are widespread in sub-Saharan Africa, with a few species extending to Madagascar and Reunion and one species on the Arabian Peninsula. Most species occur in damp or wet habitats.

Eulophia species can be found in worldwide but are most diverse in Africa, where some species grow in grasslands in eastern and southcentral Africa, and others prefer a wetter habitat, namely seasonally wet grasslands, (dambos in south-central Africa, vleis in South Africa).

Habenaria species occur in tropical and subtropical regions of the Old and New World. Throughout the range of the genus*, Habenaria* species frequently grow in damp or wet habitats including marshes, bogs, water meadows, seasonally flooded, seepage slopes and wet flushes on hillsides, riverbank habitats, swamp forest, and tropical wet evergreen forest.

Roeperocharis species occur in eastern Africa, from Ethiopia to Malawi and also in Cameroon. They are inhabitants of montane grassland at elevations up to 2440 m; some grow in drier areas, but other congeneric orchids are usually found in bogs and other wet areas.

Satyrium species occur throughout sub-Saharan Africa, found primarily in the temperate and montane areas. A few species are also found in Madagascar, Sri Lanka, India, Nepal,

Myanmar, and PR China. In Africa most species of the genus *Satyrium* grow in full sunlight in open habitats, ranging from fynbos and coastal scrub in South Africa to marshland and montane grasslands in tropical and temperate Africa. A large number of species can also be found in the miombo woodland of central Africa.

Source: eMonocot, 2017

Uses

Food

The tubers are washed to remove the soil, dried in the sun and pounded to produce a powder. Various ingredients including a paste of groundnuts (peanuts), salt, chilli, soda and water are added to the powder and cooked in a saucepan and then baked into a cake. This is then consumed in the home, or sold at market.

Cultivation

All orchids used for chikanda are currently harvested from the wild and there is no commercial or local cultivation of any species for this product. However, a Darwin funded research project between Royal Botanic Gardens, Kew, Uppsala and Copperbelt Universities is looking at 'sustainable orchid harvest, cultivation and conservation' in Zambia. So far, protocols for micropropagation of orchid tubers have been produced and cultivation trials in greenhouses are currently in progress in Zambia with a view to setting up local cultivation projects to support livelihoods associated with orchid harvesting (Chikanda Orchid Conservation Initiative, 2017).

Left: Micropropagation of chikanda orchid species; Right: Chikanda orchid species growing in the Zambian nursery. Image credit: Chikanda Orchid Conservation Initiative

Wild Harvesting

Plants are uprooted with a hoe, stick, or crowbar-like prod, after which the tubers are broken off the plant and removed from the soil (H. de Boer, pers. comm. 2017). Usually no replanting occurs after harvest, but occasionally harvesters will replace one of the tubers if any of the chikanda orchids have more than one tuber; this is not often the case, but harvesters report that some species have 2-5 tubers (S. Veldman, pers. comm. to C. Rutherford 2016).

Freshly harvested orchid tubers. Image credit: Chikanda Orchid Conservation Initiative.

Amount

Over the past 15 years an average of 4 million tubers have been imported by Zambia every year (S. Veldman, pers. comm. to C. Rutherford 2017). A total of 3000 *debe* or tins of chikanda are said to have come from Tanzania. One *debe* can contain 1100–2900 tubers, depending on the size of the tubers. Three thousand tins of tubers from the Iringa region in Tanzania would equate to approximately 3.3 million individual tubers. Mufindi and Sumbawanga are two other regions in the country that are often reported as sources, and together account for an estimated 170 tins. The estimates add up to 3.8 million Tanzanian orchid tubers that are exported to Zambia each year (Veldman et al. 2014).

According to more recent information, around four million tubers are exported from Tanzania, with about one million more from Angola, Malawi and DRC (Kew Magazine, 2017).

Commercially traded forms

The tubers are not processed before they reach the retailer/consumer. Harvesters brush off the dirt and transport the tubers in rice bags to local markets as soon as possible. A bag of fresh tubers has a limited shelf-life; unlike salep, the tubers are not dried, but traded fresh, and also ground relatively fresh (H. de Boer, pers. comm. 2017). Occasionally they are stored in soil to prevent rotting (S. Veldmann, pers. comm. 2017). Tubers are the main

commodity found in the markets, but there is also a small amount of ground powder available, and snack vendors sell cake they have prepared. Tunduma, a small Tanzanian town at the border with Zambia, seems to be the major hub for chikanda trade between the two countries. Tanzanian middlemen gather tubers from all over the country in their storage units and Zambian market vendors come to purchase stocks for further distribution within Zambia (Davenport and Ndangalasi, 2003).

Fresh, ground and prepared Chikanda. Image credit: Chikanda Orchid Conservation Initiative

Legislation / Conservation

All species of orchids used in chikanda are listed on CITES Appendix II and as the tubers and parts and derivatives are not exempt under this listing permits are required for their trade. All consumer and exporter countries of chikanda are signatories to this Convention. Through its National Legislation Project, the CITES Secretariat categorised the national legislation in the DRC as legislation that is believed generally to meet the requirements for implementation of CITES; in Malawi, Tanzania and Zambia as legislation that is believed generally not to meet all of the requirements for the implementation of CITES; and in Angola as legislation that is believed generally not to meet the requirements for the implementation of CITES (NLP, 2017).

Tanzania's National Parks Act 'prohibits or controls the cutting, damaging or removal of any vegetation whether alive or dead within a national park' (MNRT, 2002).

However, scientists currently working in the field have noted that awareness of CITES in these countries appears to be limited and no enforcement of CITES regulations has been observed at border crossing points into Zambia (S. Veldman and H. de Boer, pers. comm. 2017).

According to the Nyika-Vwaza (UK) Trust, which works to promote the conservation, protection and improvement of the physical and natural environment of the Nyika National Park and the Vwaza Marsh in Malawi, illegal harvesting of orchids in Nyika started in 2005 and by 2010 over 118 people had been arrested in connection with illegal harvesting of orchids. The problem started in the eastern side of the park because it was easy for Tanzanian businessmen to visit the nearby villages to buy the illegally harvested orchid tubers. Around 1.2 tonnes of orchids were confiscated from poachers in 2013.The illegal digging of orchids is now spread to many parts of the park. The most targeted species are *Disa satyriopsis, Disa ochrostachya* and *Disa robusta*. *Disa satyriopsis* is found only in Nyika National Park and may be on the verge of extinction (Nyika Vwaza Trust Newsletter, 2014).

Trade

Originally chikanda was consumed by the Bemba tribe in north-east Zambia, and the Nyamwanga, Nyika, Nyiha, Fipa, Lungu and Ndali tribes in southern Tanzania, harvested on a small scale and consumed locally. Rural populations are now moving to the city, and chikanda is rising in popularity. There is now a long supply chain stretching from rural collectors to city-based traders who in turn sell the tubers to restaurants and snack vendors (BBC, 2016). Research is currently being undertaken to learn more about the harvesting times, harvested quantities and sustainability issues arising from chikanda trade (DeBoer Laboratory website, 2017).

There appears to be no international trade beyond the region. However it could be that individual travellers may return home to the USA or Europe with ground chikanda powder or cake from Zambia in their luggage for personal consumption (S. Veldmann, pers. comm. 2017).

Using the CITES Trade Database covering the years 2006-2016 no trade was recorded from Angola, DRC, Malawi, Mozambique, Tanzania and Zambia for *Brachycorythis* spp., *Disa* spp. and *Satyrium* spp. Two dried plants of *Habenaria* species were exported from Zambia to the UK in 2008.

Identification

Most of the species targeted for chikanda belong to the genera *Disa*, *Satyrium* and *Habenaria*, but as the orchid tubers are morphologically complex to identify it is difficult to

know which species are used for chikanda production (Davenport and Ndangalasi, 2003, Bingham, 2009; Veldman et al. 2014). A recent study used DNA barcoding and metabarcoding to identify which species are used, analysing both unprepared orchid tubers and ready-made chikanda. Next Generation Sequencing using Ion-Torrent PGMTM has proved successful in identifying species in prepared chikanda to genus level, and in some cases to species level. A total of six ready-made chikanda samples were analysed and revealed the presence of six *Disa* species, eleven *Satyrium* species and one *Habenaria* species. However, the sequence reference database needs to be expanded to include more of the orchid species found in southern Africa to enable a more comprehensive analysis (Veldman et al., 2014, 2017).

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Annex A – Current list of orchids used in Chikanda based on literature

Supplied by Dr Sarina Veldman, Uppsala University, Sweden

Accepted species names (plantlist.org)	Species as mentioned in literature	Vernacular name*	Country	District/city/ market	Reference
Brachycorythis sp.	*Brachycorythis* sp.	mishilamishila (Bem?)	Zambia	Lusaka (Soweto market)	Bingham et al. 2003
Brachycorythis pleistophylla Rchb.f.	*Brachycorythis pleistophylla* Rchb. f.	ligosi (Wan)	Tanzania	Makete	Hamisy, 2007; Mapunda, 2007
Disa aequiloba Summerh.	*Disa aequiloba* Summerh.	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Mbozi (Chipumpu Ndalambo, Kapele)	Nyomora, 2005
Disa engleriana Kraenzl.	*Disa engleriana* Kraenzl.	n/a	Malawi	n/a	Kasulo et al. 2009
Disa erubescens Rendle	*Disa erubescens* Rendle	masekendi (Kin?), liseku (Kin, Wan), makaha ga mlutu (Kin, Bna), masekele (Kin), masekeni (Kin)	Tanzania	Mbozi (Chipumpu), Makete	Nyomora, 2005; Hamisy, 2007; Mapunda, 2007; Challe, 2009
Disa baurii Bolus	*Disa hamatopetala* Rendle	ntetemera	Tanzania	Mbinga (Lyawiki)	Hamisy, 2007
Disa fragrans Schltr. subsp. *fragrans*	*Disa leucostachys* Kruenzl.	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Kipengere grassland	Davenport & Ndangalasi, 2001; Nyomora, 2005; Hamisy, 2007
Disa ochrostachya Rchb.f.	*Disa achrostachya* Rchb. f.	n/a	Tanzania	Makete	Hamisy, 2007; Mapunda, 2007
Disa robusta N.E.Br.	*Disa robusta* N.E.Br.	chukande kijike (?), lidala (?), ngulingusi king'ina (Wan), liseku (Kin, Wan), manene (Kin), masekeniyakizungu (Kin), mekundu (Kin, Wan), vikubwa (Kin), vyekundu (Kin)	Malawi; Tanzania	Makete	Davenport & Ndangalasi, 2001; Hamisy, 2007; Mapunda, 2007; Challe, 2009; Kasulo et al. 2009
Disa walleri Rchb.f.	*Disa walleri* Rchb.f.	ichinyeka mulundu (Bem?); chikanda/masekelesekele (Kin?, Wem?)	Zambia; Tanzania	Kunda Lumwansha (Chief Chibale, Serenje District); Rukwa (Mbizi hills; Molo hills Msandamuungano), Mbeya (Umalila, Ilembo); Njombe (Kifanya)	Bingham et al. 2003; Nyomora, 2005
Disa welwitschii subsp. *occultans (Schltr.) H.P.Linder*	*Disa tanganyikensis* Summerh.	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Makete (Tandala)	Nyomora, 2005
Disa zombica N.E.Br.	*Disa zombica* N.E.Br.	mheng'enyula (?)	Malawi;	Mbinga (Lyawiki)	Hamisy, 2007; Kasulo et al.

			Tanzania		2009
Eulophia schweinfurthii Kraenzl	*Eulophia schweinfurthii* Kraenzl	lisesa (Kin)	Tanzania	Makete	Hamisy, 2007; Mapunda, 2007; Challe, 2009
prob. *Habenaria* sp.	prob. *Habenaria* sp.	matibu (Bem?)	Zambia	Lusaka (Soweto market)	Bingham et al. 2003
Habenaria adolphii Schltr.	*Habenaria adolphii* Schltr.	vinying'inya (?)	Tanzania	Songea (Madaba LITI & Mgendagenda village)	Nyomora, 2005
Habenaria clavata (Lindl.) Rchb. f.	*Habenaria clavata* (Lindl.) Rchb. f.	n/a	Malawi	n/a	Kasulo et al. 2009
Habenaria cornuta Lindl.	*Habenaria cornuta* Lindl.	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Ileje-Vwawa road	Nyomora, 2005
Habenaria humilior Rchb.f.	*Habenaria humilior* Rchb.f.	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Rukwa (Molo hills)	Nyomora, 2005
Habenaria praestans Rendle	*Habenaria praestans* Rendle	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Mbeya (Umalila, Izonzo)	Nyomora, 2005
Habenaria xanthochlora Schtr.	*Habenaria xanthochlora* Schtr.	mamkumungu (Kin), manseke (Kin), manseke makubwa (Kin), mviringo (Kin), likose (Kin, Bna, Wan), liseke (Kin, Bna, Wan)	Tanzania	Makete	Hamisy, 2007; Challe, 2009
Roeperocharis wentzeliana Kraenzl	*Roeperocharis wentzeliana* Kraenzl	kaloba (?), masekele (Kin)	Tanzania	Mbinga (Kitulo National Park)	Hamisy, 2007; Challe, 2009
Satyrium amblyosaccos Schltr.	*Satyrium amblyosaccos* Schltr.	n/a	Malawi	n/a	Kasulo et al. 2009
Satyrium breve Rolfe	*Satyrium breve* Rolfe	chikanda (Bem, Fip, Kin, Nya, Wan, Zam)	Tanzania	Kipengere	Nyomora, 2005
Satyrium buchananii Schtr.	*Satyrium buchananii* Schtr.	nshondomana (Bem?); lisekeni (Wan), ligosi (Kin, Bna), dochamua (Kin, Bna), likosi (Bna, Wan), liseke dochamua (Kin, Bna), liseke dume (Kin, Bna) liseke kiume (Kin), magosi (Kin, Bna, Wan), masekeni dume (Kin), masekeni magosi (Kin, Bna), sisekeni sigosi (Wan), titisigosi (Kin), visekeni vikhosi (Kin, Bna, Wan), visekeni vigosi (Kin, Wan)	Tanzania; Zambia	Njombe; Makete	Davenport & Ndangalasi, 2001; Bingham et al. 2003; Hamisy, 2007; Mapunda, 2007; Challe, 2009; Kasulo, 2009
Satyrium carsonii Rolfe	*Satyrium carsonii* Rolfe	utupata (Bem?)	Zambia	Kunda Lumwansha (Chief Chibale, Serenje District); Rukwa (Mbizi hills; Molo hills	Bingham et al. 2003; Kasulo et al. 2009

				Msandamuungano), Mbeya (Umalila, Ilembo)	
Satyrium chlorocorys Rchb.f. ex Rolfe	*Satyrium chlorocorys* Rchb.f. ex Rolfe	chikanda jike (Kin?)	Tanzania	Rukwa (Molo hills)	Nyomora, 2005
Satyrium coriophoroides A.Rich.	*Satyrium sacculatum* (Rendle) Rolfe	kikande (Ngo), masehelesehele (Kin?), vikandokando (Kin, Wan?), chikanda (Bem, Swa)	Tanzania	Songea (Makimbija and Wino), Njombe (Makoga village)	Nyomora, 2005
Satyrium crassicaule Rendle	*Satyrium crassicaule* Rendle	kikande (Ngo), ligosi (Kin, Bna), masekerere (Kin?, Wem?)	Tanzania	Makete (Tandala), Makete (Kitulo National Park)	Nyomora, 2005; Hamisy, 2007
Satyrium kitimboense Kraenzl.	*Satyrium kitimboense* Kraenzl.	n/a	Zambia	Kunda Lumwansha (Chief Chibale, Serenje District); Rukwa (Mbizi hills; Molo hills Msandamuungano), Mbeya (Umalila, Ilembo)	Bingham et al. 2003
Satyrium monadenium Schltr.	*Satyrium monadenium* Schltr.	ngulingusi kikambako (Wan), chikanda chekundu (Kin?)	Tanzania	Kinyika	Davenport & Ndangalasi, 2001
Satyrium riparium Rchb.f.	*Satyrium riparium* Rchb.f.	kalobo (Bem?)	Zambia	n/a	Bingham et al. 2003
Satyrium robustum Schltr.	*Satyrium robustum* Schltr.	chikande ligosi (Kin, Bna), kidume (Swa?)	Tanzania	Makete	Hamisy, 2007
Satyrium sceptrum Schtr.	*Satyrium acutirostrum* Summerh.	chikande (Swa?)	Tanzania	Makete	Hamisy, 2007
Satyrium trinerve Lindl.	*Satyrium atherstonei* Rchb. f.	matibu (Bem?); chikande kidume (Swa?), ligosi (Kin), ingingi´(Kin) jike (Kin), lidala (Kin), liseke jike (Kin, Bna), lisekeni (Wan), lisekenilidala (Kin, Wan), madala (Kin), masekenimadala (Kin, Bna), numbunumbu (Kin), sidala (Kin, Bna), visekenividala (Kin, Wan), vijike (Kin)	Tanzania; Zambia	Makete	Hamisy, 2007; Mapunda, 2007; Challe, 2009

General study on orchids used in the cosmetic and personal care industry

Species identified for future case studies necessary to determine the effects of an exemption of finished cosmetic products containing orchid parts and derivatives on the conservation of the species in the wild

On behalf of the Swiss Management Authority, the Federal Food Safety and Veterinary Office (FSVO)

Compiled by Madeleine Groves and Catherine Rutherford
March 2018

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Introduction

There are around 8-10 orchid species or genera used in as ingredients in cosmetic and personal care products that have not yet been the subject of in depth case studies. It appears that many of these species are artificially propagated in large numbers, particularly in Asia and Europe, specifically for use as ingredients in finished products, used in the medicinal, food and cosmetic and personal care industries. Some of these species have been used in traditional medicine for many years; others have only recently entered into trade as extracts used in the cosmetic and personal care industry. Another species not listed in this report, *Anoectochilus formosanus* Hayata, found in Nansei Shoto and Taiwan (PoC), was identified as being used as a cosmetic ingredient in a response to the questionnaire issued with Notification 2018/004; this species would also benefit from further research.

Bletilla striata

Taxonomy

Bletilla striata (Thunb. ex A. Murray) Rchb.f. is an accepted name (WCSPF, 2018).

Conservation status

This species has not yet been assessed for the IUCN Red List (IUCN, 2018).

Cultivation

This species is considered easy to cultivate as an ornamental, including by seed, and can be grown rapidly by division. The bulbous rhizomes can be stored for short periods without harming the plant. Three *Bletilla* species (*B. striata, B. ochracea, B. formosa*) are grown as garden plants in European countries, including *B. striata* purple and white varieties which have long been in the horticultural trade (Schippmann, 2001). This species is available on the Internet (18 USD for two tubers). At present, *Bletilla striata* is widely grown in Yunan, Sichuan, Guizhou and Hunan. The technique of directly sowing seeds for seedlings is applied widely, reducing the cost of producing seedlings. It is estimated there are about 5,000 hectares cultivating *Bletilla striata* in China.

Trade

Other than those identified by Brinckmann (2014), no other *Bletilla* species or hybrids were found to be in trade specifically for the cosmetic trade, although a number of cosmetic finished products containing extracts of this species were identified.

Bletilla striata is in trade as an orchid extract used in the cosmetic industry and as a medicinal and is reported in the CITES Trade Database as in trade as live and dried plants, extracts, derivatives, medicines and roots, the majority from artificially propagated sources. A CITES trade study was carried out for this species for the years 1975-1997 (Schippmann, 2001) and some aspects of the trade remain unchanged, such as Japan being the main exporter of live plants. However, some aspects have changed, such as the trade in derivatives; PR China was the only significant exporter to the Republic of Korea but this has shifted with the Republic of Korea now exporting large amounts of artificially propagated material to Japan. The Netherlands is by far the largest importer of artificially propagated live plants. The trade in extracts (2013-2016) shows the Republic of Korea as the major exporter and re-exporter mainly to Japan. It is difficult to interpret this trade to assess whether it is to supply the horticultural or medicinal industries, but given the rise in the use of orchids in cosmetics and the large cosmetic industries in Japan and the Republic of Korea some of this trade may be for the cosmetic and personal care product industry.

Selected finished products in European or global trade

Product Name: Wei East Bright Lights Rice Milk Spot Brightener and Wei East Bright Lights Clarifying Cleanser

Marketer: Made in China and distributed by Wei East International, PO Box 525, Newtown Square, PA 19073, USA Tel: US - 888-WEI-EAST OR 42/43 Chagford Street London NW1 6EB, United Kingdom. Website: help@weieast.com

Bulbophyllum

Taxonomy

No taxonomic issues.

Conservation status

Fifty eight species of *Bulbophyllum* have been assessed for the IUCN Red List.

Trade

Brinckmann (2014) did not identify *Bulbophyllum* species in trade specifically for the cosmetic trade. This report has identified an orchid extract associated with *Bulbophyllum* spp. (see Table 1) and a number of finished products containing this extract.

The CITES Trade Database (2009-2017) records numerous species of this genus together with "*Bulbophyllum* spp." and "*Bulbophyllum* hybrid" in trade as live and dried plants, cultures, flowers, leaves, seeds, specimens and stems, the majority from artificially propagated sources. Excluding seeds and specimens, all the other parts and derivatives can be used in the manufacture of orchid extracts.

The largest importer of cultures is France, followed by Austria, exported by Thailand, Malaysia and Madagascar. Madagascar is also the only exporter of dried plants (all wild sourced) with Austria, the US, Australia and France the largest importers since 2007. All trade reported as wild sourced for species of *Bulbophyllum* is from Madagascar, apart from that reported for scientific purposes.

Table 1 lists those extracts made from *Bulbophyllum* spp. found in finished cosmetic products.

Table 1 – *Bulbophyllum* species in trade as cosmetic/ personal care product ingredients

Names	Information
Trade name: Orchid Extract **INCI Name**: none found **Botanical name:** *Bulbophyllum* spp.	This extract is linked to the White Sands finished products below. Various articles state that roughly 2.2 pounds of roots is needed to make just 1 gram of orchid extract. Since a pure orchid extract would be very expensive, a lower cost alternative was sought. Testing began with combining silicones that were light weight and volatile to the orchid extract. Volatile silicones were used as they dissipate quickly and allowed the hair to receive the same benefits of the orchid oil and achieve all of its natural capabilities. Therefore it is possible the products do not contain orchid extracts. The finished product manufacturer was contacted for confirmation of use of orchids in their products. No reply received to date

Selected finished products in the European or global market

Product Name: White Sands Orchid Oil, Orchid Bliss Conditioner and Orchid Bliss Shampoo

Marketer: White Sands, 27631 La Paz Rd, Ste G, Laguna Niguel, California 92677-3945, USA Tel: +(949) 206-1300 Website: www.whitesandsproducts.com

Ingredients: Cyclomethicone, Dimethiconol, Caprylic/Capric Triglyceride, (**Bulbophyllum** Sp.), Fragrance (**orchids**)

Product Name: White Sands Orchid Bliss Gift Set

Marketer: White Sands 27631 La Paz Rd, Ste G, Laguna Niguel, California 92677-3945, USA Tel: (949) 206-1300 Website: www.whitesandsproducts.com

Ingredients: **Bulbophyllum** sp.

Cattleya and intergeneric hybrids

Taxonomy

Brinckmann identified *Brassocattleya* Marcella Koss extract and a variant of this, *Brassocattleya* Marcella Koss 'Pink Marvel'. Brassocattleya is an intergeneric hybrid between *Cattleya* and *Brassavola*. One other *Cattleya* extract identified in trade is simply called Cattleya Extract and is a hybrid variant: Lc George Baldwin and Lc Drumbeat. "Lc" is an abbreviation of *Laeliocattleya*, an intergeneric hybrid between *Laelia* x *Cattleya*.

Conservation status

No *Cattleya* species have yet been assessed for the IUCN Red List, and nor have the hybrids identified in trade.

Trade

Other than those identified by Brinckmann (2014), no *Cattleya* hybrids were found to be in trade specifically for the cosmetic trade.

Cattleya hybrids are in trade as artificially propagated live plants, flowers, flower plants, dried plants, tissue cultures, roots and unspecified material. Thailand is the main exporter in 2015 of live plants to Viet Nam, Japan, Réunion Island, Republic of Korea and India. The majority of tissue cultures are exported from Taiwan PoC and Thailand to France, all exports of dried plants are exported from Thailand to France, and all roots are exported by Brazil to Germany, the US and Thailand.

Looking across the trade in all *Cattleya* species recorded in the CITES Trade Database, the trade in tissue cultures is all imported by France, nearly all exported by Brazil with some recent trade from Thailand. These species have not yet been found in trade for cosmetic use. There is one export of dried plants of *C. walkeriana* from artificially propagated sources from Thailand to France in 2012.

Selected finished products in the European or global market

No finished products were found in trade containing *Cattleya* hybrid extracts other than those identified in Brinckmann (2014).

Cycnoches

Taxonomy

The only species identified in trade, *Cycnoches cooperi* Rolfe, is an accepted name (WCSPF, 2017).

Conservation Status

Cycnoches cooperi has not yet been assessed for the IUCN Red List.

Trade and cultivation

Other than those identified by Brinckmann (2014), no *Cycnoches* species or hybrids were found in trade specifically for the cosmetic trade, although a number of finished products and technical and trade extract names for this species were identified.

This species is in wide cultivation since it was first described in 1913. It is in trade as species and hybrids, in particular crossed with the genus *Catesetum*.

The only *Cycnoches* species found in trade as a component of cosmetic and personal care products is a Peruvian species, *Cycnoches cooperi*. Sixteen *Cycnoches* species, including *C. cooperi*, together with "*Cycnoches* Hybrid" and "*Cycnoches* spp." are reported in trade in the CITES Trade Database. All trade in *Cycnoches* species is reported as artificially propagated with some trade for scientific purposes, except one record of trade of 24 live plants exported from Nicaragua to China in 2015.

Trade statistics record *C. cooperi* in trade as live plants, extracts, derivatives and oil, all reported from artificially propagated sources. The main exporter of live plants of *C. cooperi* is Peru, followed by Ecuador, the USA and Malaysia. France is the main exporter of *C. cooperi* derivatives, extracts and oil, with the majority going to Switzerland. Quantifying the trade is not possible as the units of quantity are not always recorded for derivatives. German re-exports are recent (starting in 2014), mainly of extracts (origin France), to Parties outside of the EU. Switzerland re-exports extracts and oil (origin France) only to Germany (2014-2015). The USA only imports and exports live plants.

The trade in derivatives and oil commences between 2012 and 2014 and for extracts from 2009. This trade coincides with an increased interest in the use of orchids in cosmetics and personal care products and the submission of related patents.

Selected finished products in European or global trade

Product Name: Phytospecific Thermoperfect 8 Heat Protecting Serum

Manufacturer and Marketer: Alès Group S.A. (previously known as the PHYTO-LIERAC Group) 99 rue du Faubourg Saint Honoré 75008, Paris, France. Principle subsidiaries - Alès Group Usa Inc.; Alès Groupe Benelux S.A.R.L. (Belgium); Alès Groupe Canada; Alès Groupe Cosmetic Deutschland GmbH (Germany); Alès Groupe Espana S.L. (Spain); Alès Groupe Industrie; Alès Groupe Italia S.p.A. (Italy); Alès Groupe Polska (Poland); Alès Groupe Suisse (Switzerland); Alès Groupe UK Ltd.; Laboratoires

Ducastel; Laboratoires Phytoderm; Laboratoires Lierac; Laboratoires Phytosolba; Parfums Caron. UK Email: contact@phyto-haircare.co.uk Website: http://www.alesgroupe.com/

Ingredients: Jericho Rose, Botanical Kératrix, **Black Orchid Oil**

Product Name: Secret de Nuit Intense Hydration Regenerating Night Cream

Marketer: Alès Group (previously known as the PHYTO-LIERAC Group) 99 rue du Faubourg Saint Honoré, France. UK Email: contact@phyto-haircare.co.uk Website: http://www.alesgroupe.com/

Ingredients: Silybum Marianum Fruit Extract, Isodecyl Neopentanoate, Glycerin, Aqua, Cetearyl Alcohol, Ricinoleamidopropyltrimonium Methosulfate, Butyrospermum Parkii (Shea) Butter, Wine Extract, Helianthus Annuus (Sunflower) Seed Extract, Caprylic/Capric Triglyceride, Polyacrylamide, Xanthan Gum, Ceteareth-33, Parfum (Fragrance), Stearyl Alcohol, C13-14 Isoparaffin, Chlorphenesin, Polyglyceryl-3 Distearate, Wheat Amino Acids, Laureth-7, Macadamia Ternifolia Seed Oil, Polysorbate-60, Guar Hydroxypropyltrimonium Chloride, Myristic Acid, Palmitic Acid, Stearic Acid, Benzyl Alcohol, **Cycnoches Cooperi (Orchid) Flower/Leaf Extract**, Methylisothiazolinone Phenoxyethanol, Potassium Sorbate, Citric Acid, Triticum Vulgare (Wheat) Flour Lipids, Ethylhexylglycerin, Phosphoric Acid, Potassium Metabisulfite, Methylchloroisothiazolinone

Product Name: Terry Base Prime to Fix – eyelid base perfector

Marketer: By Terry, 10 Avenue Victor Hugo, 75016, Paris. Tel.: +33 (0)1 55 73 00 73 Wesite: http://www.byterry.com/

Ingredients: Aqua, Octyldodecanol, Hamamelis Virginiana Flower Water, Salvia Officinalis (Sage) Leaf Water, Sambucus Nigra Propylene Glycol Laurate, Yeast Extract, Glycerin, Methyl Methacrylate Crosspolymer Hydrogenated Coconut Oil, Propylene Glycol, Imperata Cylindrica Root Extract, Helianthus Annuus (Sunflower) Seed Oil, Moringa Pterygosperma Seed Extract, Acrylates/C10-30 Alkyl Crosspolymer, Tocopheryl, Tromethamine, Phenoxyethanol, Alcohol Denat, Parfum, Ethyl Cellulose, Propylene Glycol Isostearate, Methylparaben, PEG-8, Acrylamide/Ammonium Acrylate Copolymer Tetrasodium EDTA, Ethylparaben, Polyisobutene, Butylparaben, Prolinamidoethyl Imidazole, Polymethyl Methacrylate, Potassium Sorbate Mica, Carbomer, Citric Acid, Sodium Benzoate, Isobutylparaben, Propylparaben, Panax Ginseng Root Extract, Titanium Dioxide, Centaurea Cyanus Flower Extract Chlorphenesin, Polysorbate 20, Ribes Uva-Crispa Fruit Extract, Tulipa Hylcrida Flower Extract, Papaver Rhoeas Petal Extract, Disodium Edta, **Cycnoches Cooperi (Orchid) Flower/Leaf Extract**, Citronellol, Hexyl Cinnamal, Hydroxyisohexyl 3-Cyclohexene Carboxaldehyde, Isoeugenol, Linalool

Product Name: Lierac Premium Crème Voluptueuse Anti-Âge Absolu, Lierac Premium Masque Suprême Anti-Âge Absolu and Lierac Premium Élixir Huile Somptueuse Anti-Âge Absolu

Marketer: Alès Group (previously known as the PHYTO-LIERAC Group) 99 rue du Faubourg Saint Honoré, France. UK Email: contact@phyto-haircare.co.uk Website: http://www.alesgroupe.com/

Ingredients: Lierac Premium Crème Voluptueuse Anti-Âge Absolu 50 ml and 30ml Aqua (Water), Caprylic/Capric Triglyceride, Pentaerythrityl Tetraethylhexanoate, Glycerin, Dimethicone, Butyrospermum Parkii (Shea Butter), Cetearyl Alcohol, Butylene Glycol, Glyceryl Stearate, Peg-100 Stearate, Hexyldecanol, Hexyldecyl Laurate, Rosa Hybrid Flower Extract, Elaeis Guineensis (Palm) Oil, Cetyl Palmitate, Parfum (Fragrance), Synthetic Fluorphlogopite, Gossypium Herbaceum (Cotton) Seed Oil, Cetearyl Glucoside, Bidens Pilosa Extract, **Cycnoches Cooperi (Orchid) Flower Leaf Extract**, Sodium Polyacrylate, Tocopheryl Acetate, Hydrogenated Polydecene, Chlorphenesin, Sodium Benzoate, Sodium Salicylate, Xanthan Gum, Propylene Glycol, Teprenone, Sodium Hyaluronate, PPG-5-Laureth-5, Geraniol, Hexyl Cinnamal, Amy Cinnamal, Tocopherol, Silica, Citric Acid, Potassium Sorbate, Tetrasodium Glutamate Diacetate, Acetyl Hexapeptide-51 Amide, (Yellow 5)

Product name:Decleor Aroma Night Beuty Cream wrinkle Firmness and Decleor Aroma Night Cream Regenerating
Marketer: L'Oreal (Decleor is a L'Oreal brand) L'Oréal International, 41, Rue Martre, 92117 Clichy Cedex, France. Tel: +33(0) 1 47 56 70 00 Website: https://tinyurl.com/jw3bhzb

Product Name: Carita Beauty Diamond Eye Program - Anti-Ageing Eye Contour Elixir – Day and Anti-Ageing Eye Contour Concentrate - Night:
Marketer: CARITA USA, 300 Atlantic Street, Suite 210, Stamford, CT 06901, USA Tel: +1-888-852-2829 Website: http://www.caritadirect.com/
Ingredients: **Anti-Ageing Eye Contour Elixir - Day**: aqua (water), butylene glycol, dimethicone, squalane, nylon-12 fluorescent brightener 230 salt, cetearyl alcohol, glycerin, benzimidazole diamond amidoethyl urea carbamoyl propyl, polymethylsilsesquioxane, euglena gracilis extract, c20-22 alkyl phosphate, sunflower seed oil sorbitol esters, propylene glycol, c20-22 alcohols, butyrospermum parkii (shea butter), phenoxyethanol, peg-100 stearate, glyceryl stearate, triethanolamine, sodium polyacrylate, tourmaline, saccharomyces cerevisiae extract, mica, polyvinylalcohol crosspolymer, caprylyl glycol, 1,2-hexanediol, ci 77891 (titanium dioxide), disodium edta, tocopherol, glycine soja (soybean) oil, sequoia sempervirens leaf cell extract, nymphaea caerulea leaf cell extract, diamond powder, sequoiadendron gigantea bud extract, ethylhexylglycerin, **cycnoches cooperi (orchid) extract**, ci 75470 (carmine), rosa damascena flower extract, potassium sorbate, biotin.

Dendrobium

Taxonomy

Of the seven species of *Dendrobium* identified in trade as cosmetic or personal care product ingredients (Brinckmann, 2014), two species are synonyms: *D. huoshanense* Z.Z.Tang & S.J.Cheng and *D. officinale* Kimura & Migo are synonyms of *D. catenatum* Lindl. (UNEP, 2017; WCSPF, 2018). Species + (UNEP, 2017) lists *D. phalaenopsis* Fitz. as an accepted name whereas the World Checklist of Selected Plant Families has *D. phalaenopsis* Fitz. as a synonym of *D. bigibbum* var. *superbum* Rchb.f.

Conservation status

Only two of the species identified in trade as cosmetic ingredients (Brinckmann, 2014) have been assessed under the IUCN Red List (China Plant Specialist Group., 2004):

Table 1 – *Dendrobium* species assessed for the IUCN Red List

Species	IUCN Red List category	Details
Dendrobium huoshanense (Synonym of *D. catenatum*	Critically Endangered A4c ver. 3.1	No details. Assessment carried out in 2004 and noted as requiring updating
Dendrobium officinale	Critically Endangered A4c ver. 3.1	No details. Assessment carried out in 2004 and noted as requiring updating

Trade

Other than those identified by Brinckmann (2014), no *Dendrobium* species were found to be in trade for the cosmetic industry, although a number of finished products and technical and trade names for *Dendrobium* extracts were identified. The global trade in dietary supplements and body/muscle enhancing powders and pills that list *Dendrobium* as an ingredient is extensive, therefore only a small sample of the finished products found in trade are shown in this report.

The CITES Trade Database (2006-2016) records over 500 *Dendrobium* species in trade as well as "*Dendrobium* spp." and "*Dendrobium* hybrid" as live plants, dried plants, flowers, stems, chips, fibres, extracts, derivatives, seeds, specimens, cultures and medicine.

The majority of cultures of *Dendrobium* hybrids are exported by Thailand to France, derivatives from Indonesia to the Republic of Korea, dried plants from Thailand to PR China and extracts from Japan to Hong Kong SAR, Canada and France. The majority of this material is reported as artificially propagated. Artificially propagated roots are exported by Thailand to Brazil and then Brazil to Germany and the US.

Raw material of *Dendrobium chrysotoxum* is documented as sourced from the TianZi Nature Reserve, PR China (see LVMH Environmental Report in the *Papilionanthe teres* Case Study) for research purposes and to supply material for extraction. The trade in dried plants commenced in 2010, the main exporter is PR China, followed by much smaller amounts

from Thailand and Switzerland, and France is the only importer. The majority of the trade in derivatives and extracts of *D. chrysotoxum* are re-exports from France (origin Thailand and PR China, source artificially propagated), that are imported by Japan, Switzerland, and Turkey. The trade in derivatives commenced in 2012 and for extracts in 2015.

The trade in artificially propagated live plants of *D. fimbriatum* is mainly exports from Lao PDR to PR China up to 2012 and for 2013-2015 exports from Thailand to the US. There is some trade in wild sourced powder, from PR China to UK (10kg) and USA (20kg), and trade in stems from Nepal (wild sourced, 9,308kg), Lao PDR and PR China (artificially propagated) to Thailand, PR China and New Zealand. There is one export of 8000 kg of wild sourced roots in 2007 from Lao PDR to PR China.

Trade in artificially propagated extracts of *D. moniliforme* is all recent exports (from 2015) from the Republic of Korea. The majority of live plants (artificially propagated) are also exported from the Republic of Korea, principally to Japan.

D. nobile is in trade as live and dried plants, derivatives, extracts, powder, medicine, roots and stems, the majority reported from artificially propagated sources. The Netherlands is the main exporter of live plants, apart from a large export from PR China to Singapore in 2013 of over 200,000 plants. Indonesia is the largest exporter of derivatives, imported by the Republic of Korea, followed by the Republic of Korea exporting to Japan. It is also the largest exporter of dried plants and stems, again to the Republic of Korea. There is some trade in wild sourced material; stems and roots from PR China imported by the Republic of Korea and Canada, and roots and dried plants from Vietnam to the Republic of Korea.

The trade in *D. officinale* is in live plants, derivatives, powder and stems. Live plant trade is low in volume (19 artificially propagated plants, 10 source code "I") from Taiwan PoC to the Republic of Korea, the US and Switzerland. The trade in derivatives is from PR China to Malaysia (22kg) and artificially propagated powder and stems are exported from PR China to New Zealand.

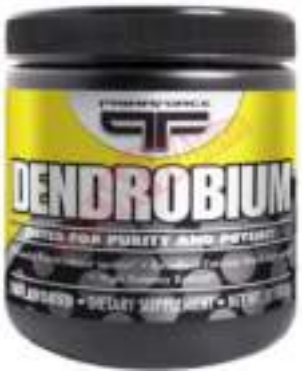
The trade in *D. phalaenopsis* is in live and dried plants and extracts. The major exporter of live plants is the Netherlands. The trade in extracts is all from artificially propagated sources, with France exporting 18kg of extracts to Switzerland between 2009 and 2010.

Selected finished products in European or global trade

Product name: Pro Supps DNPX

Marketer: Mr Supplement (Sydney), 13 Prince William Drive, Seven Hills, Sydney, NSW 2147, Australia Mr Supplement (Perth), 1/17 Beneficial Way, Wangara, Perth, WA 6065 Australia
Website: https://www.mrsupplement.com.au/dendrobium

Ingredients: Taurine, N-Acetyl L-Tyrosine, **Noble Orchid (Dendrobium noble) Stem Extract**



Product name: Primaforce Dendrobium Powder

Marketer: Primaforce, Tel: 336-395-1247 Email: info@primaforce.com Website: http://www.primaforce.com/

Ingredients: **Dendrobium Nobile (Stems and Aerial Parts) Extract**

Product Name: iHealth Dendrobium Nobile Shihu Capsules

Marketer: iHealth Nutrition, 585 Rue Fernand Poitras Terrebone, Quebec, Canada
Head office Tel: 1.450.624.1599 Toll Free: 1.800.263.7714 Email: sales@ihealthnutri.com
Website: http://www.ihealthnutri.com/

Ingredients: **Dendrobium Nobile** (Stem)

Product name: Lush Celestrial moisturiser 9-5 Cleanser

Marketer: Lush Retail Ltd Unit 22-23 Dolphin Quays, Poole, Dorset, BH15 1HU,United Kingdom Email: wecare@lush.co.uk or welcome@lush.co.uk Website: https://uk.lush.com/ingredients/fresh-dove-orchid-extract

Ingredients: Vanilla Water, Almond Oil, Almond Milk, Glycerine, Fair Trade Organic Cocoa Butter, **Fresh Dove Orchid Extract (Dendrobium)**, Cetearyl Alcohol, Stearic Acid, Triethanolamine, Methylparaben, Propylparaben.

Product name: Lush 9 to 5 Cleansing Lotion

Marketer: Lush Retail Ltd Unit 22-23 Dolphin Quays, Poole, Dorset, BH15 1HU, United Kingdom Tel: 01202 668545 Email: wecare@lush.co.uk or welcome@lush.co.uk Website: https://uk.lush.com/ingredients/fresh-dove-orchid-extract

Ingredients: Water (Aqua), Almond Oil, Stearic Acid, **Fresh Dove Orchid Extract (Dendrobium),** Everlasting Flower Absolute, Ylang Ylang Oil, Triethanolamine, Cetearyl Alcohol, Perfume, Methylparaben, Propylparaben

Note: The common name“dove orchid”can apply to different orchid genera / species including those of *Dendrobium* and *Peristeria elata.*

Product Name: Canus Goat's Milk Soap

Marketer: Canus, Canada Office - 5924 Boul. Henri Bourassa West Ville St. Laurent, Quebec, H4R 1V9 Canada Tel: +1-514-738-8998 USA Office - P0 Box 145 Leonardo New Jersey 07737, USA
Tel: +1-848-300-2227 Website: http://www.canusgoatsmilk.com/

Ingredients: Sodium palmate (hydrolyzation of palm oil in the presence of sodium); sodium palm kernelate (synthetic derived from palm kernel oil); water (aqua); glycerin (from plant lipids); fresh goat"s milk; palm kernel acid (mixture of fatty acids from elaeis guineensis [palm] kernel oil); fragrance (essential oils); **lipidami orchid flower**; sodium chloride (sea water); potassium sorbate (oil of unripened rowan berry); tetrasodium EDTA (salt); tetrasodium etidronate
NOTE: Lipidami orchid flower is linked to Dendrobium Phalaenopsis Flower Extract

Product Name: Nude Skincare Age Defence Moisturiser

Marketer: NUDE Skincare, Inc., 225 Bush Street, 20th Floor, San Francisco, CA 94104, USA
Website: http://www.nudeskincare.com/

Ingredients: Water, Dicaprylyl Carbonate, Sesamum Indicum (Sesame) Oil, Lauryl Laurate, Candelilla, Jojoba Oil, Rice Bran, Polyglyceryl-3 Esters, Glyceryl Stearate Se, Lactobacillus/Eriodictyon Californicum Ferment Extract (Yerba Santa), Glyceryl Stearate, Cetearyl Alcohol, Butyrospermum Parkii (Shea Butter), Cetyl Alcohol, Argania Spinosa Leaf Extract (Argan), Ricinodendron Rautanenii Oil (Manketti), Mauritia Flexuosa Fruit Oil (Buriti), Sodium Hyaluronate, **Dendrobium Phalaenopsis Flower Extract (Orchid)**, Glycerin, Sodium Stearoyl Lactylate, Helianthus Annuus (Sunflower) Seed Oil, Alpha-Glucan Oligosaccharide, Lactose (Milk), Sclerotium Gum, Oryza Sativa (Rice) Hull Powder, Xanthan Gum, Arginine, Vaccinium Vitis-Idaea Seed Oil (Lingonberry), Calodendrum Capense Oil (Yangu), Theobroma Grandiflorum Seed Butter (Cupuacu), Whey Protein (Lactis Proteinum), Fragrance, Galactaric Acid (Apple Pectin), Bifida Ferment Lysate (Milk), Milk Protein (Lactis Proteinum), Rosmarinus Officinalis (Rosemary) Leaf Extract, Tocopheryl Acetate (Soybean), Aloe Barbadensis Leaf Extract (Aloe vera) Phenoxyethanol, Ethylhexylglycerin, Dehydroacetic Acid, Benzyl Benzoate, Linalool, Eugenol

Orchis

Taxonomy

Of the three species of *Orchis* identified in trade as cosmetic or personal care product ingredients (Brinckmann, 2014) two are synonyms: *Orchis maculata* L. is a synonym of *Dactylorhiza maculata* (L.) Soó and *Orchis morio* L. is a synonym for *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase (WCSPF, 2017).

Conservation status

None of these species have been assessed under the IUCN Red List (IUCN, 2017).

Trade

Other than those identified by Brinckmann (2014), no *Orchis* species were found to be in trade for the cosmetic industry, although a number of finished products and technical and trade names for *Orchis* extracts were identified (see Annex 1).

The CITES Trade Database shows *Dactylorhiza maculata* in trade as artificially propagated live plants with Canada being the largest exporter (imported by Finland, the US and the UK), followed by Belgium (imported by Switzerland and Malaysia), and the Netherlands (Switzerland is the only importer). Finland is the largest importer of live plants.

Orchis mascula is in trade as artificially propagated derivatives, extracts, dried and live plants and medicine. For derivatives India is the largest exporter with major importers in the Middle East, in particular the United Arab Emirates, followed by Malaysia, with source code "I" (seizures/confiscated) recorded for material from India and Pakistan. One large shipment of derivatives from India to Latvia (2009) was of source code "I" material. For extracts from 2014 onwards India has been the largest exporter (largest importer is Latvia) and France the only re-exporter (origin Belgium) principally to the US. For live plants Belgium is the largest exporter to India and for medicine India is the largest exporter to the Russian Federation, Malaysia and the Middle East.

Anacamptis morio (Orchis morio) is in trade as artificially propagated live plants; Austria is the largest exporter followed by Belgium, and Switzerland is the only importer. For

derivatives France is re-exporting artificially propagated material (origin Belgium) worldwide.

Selected finished products in European or global trade

Product name: St Ives coconut milk and orchid extract (possibly only available in the US)

Marketer: St Ives, a brand of Unilever. Unilever US, Inc. 800 Sylvan Avenue, Englewood Cliffs New Jersey 07632, USA. Tel: +201-894-7760 Email: stives@thisismission.com

Ingredients: Water, Glycerin, Caprylic/Capric Triglyceride, Mineral Oil, Stearic Acid, Cetyl Alcohol, Cetearyl Alcohol, Urea, Butyrospermum Parkii (Shea) Butter, **Orchis Mascula Flower Extract**, Cocos Nucifera (Coconut) Fruit Extract, Dimethicone, Cyclopentasiloxane, Ceteth-10 Phosphate, Dicetyl Phosphate, Carbomer, Cyclohexasiloxane, Cetearyl Glucoside, Disodium Edta, Ethylhexylglycerin, Phenoxyglycerin, Triethanolamine, Fragrance

Product name: Botanics Triple Age Renewal Hydrating Eye Serum

Marketer: Boots is a subsidiary of Walgreens Boots Alliance, Inc. 08 Wilmot Road Deerfield, IL 60015, USA. General inquiries: USA Tel: +1 (847) 315-3700 International: +44 (0) 1932 870 550

Ingredients: Aqua (Water), Glycerin, Prunus amygdalus dulcis (Sweet almond) oil, Dimethicone, Cetearyl alcohol, Butyrospermum parkii (shea) butter, Astrocaryum murumuru butter, Sodium polyacrylate, Cetearyl olivate, Phenoxyethanol, Sorbitan olivate, Dimethicone crosspolymer, Caprylyl glycol, Ascorbyl glucoside, Citric acid, Acrylates/vinyl isodecanoate crosspolymer, Tocopheryl acetate, Sodium benzoate, Hydrolyzed hyaluronic acid, Retinyl palmitate, Steareth-20, Ethylhexylglycerin, **Orchis mascula extract**, Hesperidin methyl chalcone, Glycine soja (soybean) protein, Tetrasodium EDTA, Chlorhexidine digluconate, N-Hydroxysuccinimide, Potassium sorbate, Tocopherol, Sodium citrate, Dipeptide-2, Palmitoyl tetrapeptide-7, Palmitoyl oligopeptide, Chrysin, Bioti

Product name: Ted Gibson Hair Sheet

Marketer: Ted Gibson, USA Website: http://tedgibson.com/

Ingredients: water, hydrolyzed collagen, cetrimonium chloride, amodimethicone / cetrimoniumchloride / triceth-12, propylene glycol, alcohol, steartrimonium chloride, nonoxynol-12, hydroxypropyltrimonium hydrolyzed silk, cyclodextrin, panthenol, **orchis maculate flower extract**, lavandula angustifolia (lavender) oil, disodium EDTA, retinyl palmitate, tocopheryl acetate, ethlyexyl methoxycinnamate, methylchloroisothiazolinone / methylisothiazolinone

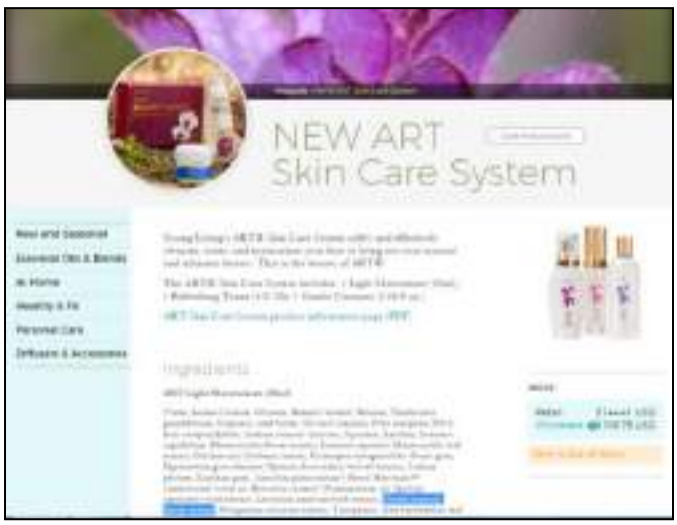
Product Name: Ted Gibson Goodnite Replenish Hair Repair Serum

Marketer: Ted Gibson, USA website: http://tedgibson.com/

Ingredients: Water (Aqua), Cyclopentasiloxane, **Orchis Maculata Flower Extract**, Lavandula Angustifolia (Lavender) Oil, Tocopheryl Acetate, Hydroxypropyltrimonium Hydrolyzed Silk, Retinyl Palmitate, Fragrance (Parfum), Glycerin, PEG-40 Hydrogenated Castor Oil, Panthenol, Methylparaben, Dimethicone, Disodium EDTA, Amodimethicone, Cetrimonium Chloride, PEG-12 Dimethicone, Steartrimonum Chloride, Hydroxyethylcellulose, Trideceth-12 .

Product Name: Vasko Todorof Orchid Jelly, Detox Cleansing Foam, Melting Pebbles and Orchid Day Cream
Marketers - Vasko Todorof Cosmetics, Senteurs d'Ailleurs, Place Stéphanie 1A, 1000 Brussels, Belgium. Tel: +32 2 511 69 69 Website: www.senteursdailleurs.com

Ingredients: all these products list **Orchis Mascula Extract** as an ingredient



Product Name: Young Living ART Skin Care System (Refreshing Toner, Gentle Cleanser and Light Moisturiser)

Marketer: Young Living Essential Oils, Thanksgiving Point Business Park, 3125 Executive Parkway, Lehi, Utah 84043, USA. Offices also in Australia, Europe, Canada, Japan, and Singapore, as well as farms around the world. Website: https://tinyurl.com/jxfs2ep

Ingredients: all products in this range list **Orchis Mascula Flower Extract** as an ingredient

Product Name: SeneDerm 3 in 1 Cleanser

Marketer: SeneGence International has offices worldwide and in the United States, Australia, and Canada. Website: https://tinyurl.com/hgc8dmv

Ingredients: Water (Aqua), Sodium Lauryl Methyl Isethionate, Disodium Cocoamphodiacetate, Sodium Polyyacrylate, **Orchis Morio (Orchid) Flower Extract**, Glucosamine HCL, Yeast Extract, Algae Extract, Urea, Sodium Hyaluronate, Phenoxyethanol Caprylyl Glucol, Ethylhexylglycerin, Hexylene Glycol, Yellow 5 & Fragrance (Parfum)

Product Name: Green Energy Organics La Recolte Des Plantes Shampoo

Marketer – Green Energy Organic. Website: https://www.worldspure.com/green-energy-organics

Ingredients: Aqua (Water), Lauramidopropyl Betaine, Sodium Cocoyl Sarcosinate, Soliul Lauroyl Glutamate, Dioleoylethyl Hydroxyethylmonium Methosulfate, Pantenol, Tocopheryl Acetate, Glycerin, Hydroxyethylcellulose, Aloe Barbadensis Leaf Extract, Malva Sylvestris (Mallow) Leaf Extract, Althea Officinalis Root Extract, Calendula Officinalis Flower Extract, Mentha Arvensis (Peppermint) Powder, Rosa Canina (Rose Hip) Fruit Extract, **Orchis Morio Flower Extract**

Product name: La Recolte Des Plantes Hair Conditioner Mask

Marketer: Green Energy Organic. Website: https://www.worldspure.com/green-energy-organics

Ingredients: Aqua (Water), Polyglyceryl-3 rice Bramate Se, Glycerin, Prunus Amygdalus Dulcis Oil, Dioleoylethyl Hydroxyethylmonium Methosulfate, Guar Hydroxypropyltrimonium Chloride, Aloe Barbadensis Leaf Extract, Calendula Officinalis Flower Extract, Mentha Arvensis (Peppermint) Powder, Althea Officinalis Root Extract, **Orchis Morio Flower Extract**, Parfum (Fragrance), Potassium Sorbate, Capryloyl Glycine, Acid Citric, Citral, Limonene, Linalool, Citral, Limonene, Linalool, Geraniol, Citronellol, Coumarin, Hexyl Cinnamal, Hydroxyisohexyl3-cyclohexene Carboxaldeyde

Note: majority of the La Recolte Des Plantes from this range include Orchis Morio Extract in the list of ingredients

Product name: Green Energy Organics La Recolte Des Plantes No. 2 Plantes eye serum
Marketer: Green Energy Organic. Website: https://www.worldspure.com/green-energy-organics

Ingredients: Aqua (Water), Caprylic / Capric Triglyceride, Cetearyl Alcohol, Cetearyl glucoside, Oryza Sativa (Rice) Starch, Glycerin, Stearic Acid, Tocopheryl Acetate, Prunus Amygdalus Dulcis (Sweet Almond) Oil, Glyceryl Stearate, Oryzanol, Xanthan Gum, Helianthus annuus (Sunflower) Seed Oil, Butyrospermum Parkii (Shea) Butter, Oryza Sativa (Rice) Bran Oil, Triticum Vulgare (Wheat) Germ Oil, Vitis Vinifera (Grape) Seed Oil, Malva Sylvestris (Mallow) Leaf Extract, Althaea Officinalis Root Extract, Calendula officinalis Flower Extract, Mentha arvensis (Peppermint) Powder, Rosa Canina (Rose Hip) Fruit Extract, **Orchis Morio Flower Extract**, Potassium sorbate, Leuconostoc (lactobacillus) / Radish Root Ferment Filtrate, capryloyl Glycine, Parfum (Fragrance), linalool, geraniol, limonene, Citral.

Product name: La Recolte Des Plantes Baume Riche Capillarie n.2
Marketer: Green Energy Organics. Website: https://www.worldspure.com/green-energy-organics
Ingredients: Aqua (Water), Polyglyceryl-3 rice Bramate Se, Glycerin, Prunus Amygdalus Dulcis (Sweet Almond)Oil, Dioleoylethyl Hydroxyethylmonium Methosulfate, Guar Hydroxypropyltrimonium Chloride, Aloe Barbadensis Leaf Extract, Calendula Officinalis Flower Extract, Mentha Arvensis (Peppermint) Powder, Althaea Officinalis Root Extract, **Orchis Morio Flower Extract**, Parfum (Fragrance), Potassium Sorbate, Capryloyl Glycine, Citric Acid, Citral, Limonene, Linalool, Geraniol, Citronellol, Coumarin, Hexyl Cinnamal, Hydroxyisohexyl3-cyclohexene Carboxaldeyde.

Product name: Dermaglow Nuvectin Instant Wrinkle Eraser
Marketer: Dermaglow, 93 Woodstream Blvd Unit 6, Woodbridge, ON L4L 7Y7, Canada Tel: +(905) 264-9697
Ingredients: Water, Glyceryl Stearate, Sesamum Indicum (Sesame Seed) Oil, Caprylic/Capric Triglycerides, Peg-150 Distearate, Cetyl Alcohol, Cetearyl Alcohol, Butylene Glycol, Hyaluronic Acid, Glycerine, Carbomer, Polysorbate 20, Palmitoyl Oligopeptide, Palmitoyl Tetrapeptide-7, Ethoxydiglycol, Aminobutiric Acid (GABA), Xanthan Gum, Methylparaben, Diazolidinyl Urea, Aloe Barbadensis (Aloe Vera), Gel, Chamomilla Recutta (Chamomile) Extract, Cucumis Sativus, (Cucumber) Extract, Camellia Sinensis (Green Tea) Extract, Gynostemma Pentaphyllum Extract, **Orchis Maculata**

(Orchid) Extract, Propylparaben, Disodium Edta, Peg-8 Dimethicone, Octyldodecanol, Tocopheryl Acetate, Retinyl Palmitate, Ascorbic Acid, Pyridoxine Hcl, Silica, Sodium Propoxyhydroxypropyl Thiosulfate Silica, Bismuthoxychloride, Ethylparaben, Eugenol

Product Name: Skinn Orchid Gel, Skinn Orchid Gel Tint, Skinn Orchid Gel Mattefying Day Treatment Seal
Marketer: Skinn Cosmetics, LLC, 4733 Torrance Blvd., Suite #974, Torrance, CA 90503, USA Tel: North America / 866-DIMITRI (866-346-4874) Outside North America / 1-951-699-7601 Email: customerservice@skinn.com Website: http://www.skinn.com/
Ingredients: Cyclomethicone, Dimethicone Crosspolymer, Zea Mays (Corn) Starch, Phenyl Trimethicone, Carthamus Tinctorius (Safflower) Seed Oil, Glycine Soja (Soybean) Sterol, Phenoxyethanol, **Orchis Mascula (Orchid) Flower Extract**, Chamomilla Recutita (Matricaria) Flower Extract, Natural Color

Product Name: Aurora De Juliis MD Oxygen Revitalizing Cleanser
Marketer: Aurora De Juliis MD, European Medi-Spa, Hillside Square, 8 Hillside Ave, Suite 102, Monclair, NJ 07042, USA. Tel: +973-388-6300 Website: http://www.auroradejuliismd.com/
Ingredients: Agua, Ammonium Lauryl Sulfate, Decyl Glucoside, Cocomidopropyl Betaine, Aloe Barbadensis Leaf Juice, Polysorbate 20, Glycol Stearate, Stearamide AMP, Glycoproteins, Panax Ginseng Root Extract, Rosa Canina Fruit Extract, Persea Gratissima (Avocado) Fruit Extract, **Orchis Maculata Flower Extract**, Camellia Olelfera Leaf Extract (Japanese Green Tea), Butlyene Glycol, Citric Acid, Cyanocobalmin (Vitamin B12), Sodium Hydroxymethylglycinate, Non Sensitizing Fragrance.

Paphiopedilum – Appendix I

Taxonomy

The name *Paphiopedilum × maudiae* (Rolfe) McQuade is listed as an unplaced hybrid name (WCSPF, 2017) or an artificial hybrid between *P. insigne* and *P. lawrenceanum*. The commonly grown cultivar (parentage – *P. callosum* var. *sanderae* and *P. lawrenceanum* var. *hyeanum*) is an albino, called 'The Queen' (P. Cribb pers. comm. to M. Groves, 2017).

Conservation status

This hybrid has not yet been assessed for the IUCN Red List (IUCN, 2017).

Trade

Other than those identified by Brinckmann (2014), no *Paphiopedilum* hybrids or species were found to be in trade for the cosmetic industry, although a number of other finished products were identified.

Looking at the CITES Trade Database (2006-2016) the trade in *Paphiopedilum* hybrids covers carvings, cultures, dried and live plants, flowers and seeds, reported as artificially propagated or traded under source code "D" (Appendix-I plants, and parts and derivatives thereof, artificially propagated for commercial purposes). There is no trade in extracts but material that can be used for extraction includes live, tissue cultured and dried plants and flowers. For tissue cultures there is a large discrepancy between the trade reported by the exporter (415) and the importer (7,732) with both source codes "A" and "D" used. Taiwan PoC (using importer data) is the largest exporter of tissue cultured plants (France is the only importer) followed by smaller volumes from France (importers are Canada, the US, Mauritius and Switzerland).

The main exporter of artificially propagated live plants is the Netherlands, followed by Taiwan PoC and Germany. There was only one export from Thailand to France of 17 artificially propagated dried plants. For flowers there is only one export in 2014 from Taiwan PoC to France of 3,092 flowers (as reported by importer).

Selected finished products in European or global trade

Product Name: Kanebo Twany Whitening Cream

Marketer: The Kao Corporation (acquired Kanebo Cosmetics, Inc. in 2006), Kanebo Ltd 20-20 Kaigan 3-chome, Minato-ku, Tokyo 108-8080, Japan. Website: http://www.kanebo.com/aboutus/global/

Product Name: Thann Sea Foam Aromatic Salt Scrub

Marketer: Thann-Oryza Co.,LTD., 23/97 22nd floor, Sorachai Building, Sukhumvit 63 Road, North Klongton, Wattana, Bangkok 10110, Thailand Tel: +662 714 3239 (to 45) Fax : +662 714 3247

Product Name: Yves Saint Laurent Revitaliser Cell Energy Boosting Lotion

Marketer: Yves Saint Laurent YSL (run independently through L'Oreal Paris that licenses the name) 41, rue Martre, 92110 Clichy, France. Website: www.ysl.com

Phalaenopsis

Taxonomy

Of the three *Phalaenopsis* species identified in trade in cosmetic or personal care products (Brinckmann, 2014) (*P. amabilis, P. lobbii* and *P. pulcherrima*), all are accepted names (WCSPF, 2017). *Doritis pulcherrima* is a synonym of *P. pulcherrima* (WCSPF, 2017).

Conservation status

None of these *Phalaenopsis* species have been assessed for the IUCN Red List (IUCN, 2017).

Trade

Other than those identified by Brinckmann (2014), *Phalaenopsis schilleriana* was identified as being in trade for the cosmetic industry in a response to Notification 2018/004. A number of finished products and technical and trade names for *Phalaenopsis* extracts were identified.

Phalaenopsis amabilis has been used to create many modern hybrids. It has been in trade since its discovery in 1750 in the Philippines and the current plants in trade are the result of cross-breeding different clones. *P. pulcherrima* is a miniature species that has been in trade since its discovery in 1833 in SE Asia. *P. lobbii* is a miniature species native to India that has been in cultivation since 1862 and is widely used in hybrid breeding. *P. schilleriana* is an easy to grow species native to the Philippines and common in trade.

Looking at the CITES Trade Database (2006-2016), *P. amabilis* is in trade as live and dried plants, derivatives, extracts, flowers and fruit, the majority of which is reported from artificially propagated sources. *P.lobbii* is in trade as artificially propagated live plants and *P. pulcherrima* as artificially propagated live and dried plants. France is the only exporter of artificially propagated extracts of *P. amabilis* (mainly to Japan and Fiji) and derivatives (over the last three years mainly to Asia including PR China and Malaysia). For all three species, dried plants are only exported from Thailand to France. All trade in *P. schilleriana* is in live, artificially propagated plants exported mainly by the Philippines and imported by Taiwan.

Selected finished products in European or global trade

Product name: Nexxus Color Assure Rebalancing Shampoo

Marketer: Nexxus is a Unilever brand. Unilever US, Inc. 800 Sylvan Avenue, Englewood Cliffs, New Jersey 07632, USA. Email: comments.nexxus@unilever.com

Ingredients: Water, Coco Betaine, Sodium Cocoyl Isethionate, Cocamidopropyl Betaine, Sodium Chloride, Fragrance, Polyquaternium 10, PPG 9, Tetrasodium EDTA, DMDM Hydantoin, Citric Acid, **Phalaenopsis Amabilis Extract**, Propylene Glycol, Hydrogenated Coconut Oil, Prunus Amygdalus Dulcis (Sweet Almond) Oil, Argania Spinosa Kernel Oil, Methylchloroisothiazolinone, PEG 150 Pentaerythrityl Tetrastearate, PPG 2 Hydroxyethyl Cocamide, Methylisothiazolinone, Red 33 (CI 17200), Blue 1 (CI 42090)

Orchid Extract

While researching this report, it was noted that many cosmetic finished products list "Orchid Extract" in the ingredients lists, with no immediate link to a botanical or industry name. This term may be linked to an industry (INCI) or technical name that can ultimately be traced back to a botanical name. However, for CITES policy and enforcement officers this may involve outreach to industry trade associations or individual companies and knowledge of and access to the various publications or databases linking extracts to botanical names e.g. CosIng Database (free access) or wINCI, the online version of the International Cosmetic Ingredient Dictionary & Handbook (fee-paid access for members of the Personal Care Product Council). The following finished products were identified in trade as containing "Orchid Extract":

Selected finished products in European or global trade

Product name: Kosé Infinity Deep Moisture Concentrate (medicated product)

Marketers: Kosé Corporation (3-6-2 Nihonbashi, Chuo-ku, Tokyo 103-8251, Japan. Website: http://www.kose.co.jp/global/en/

Ingredients: Rice Power Extract No. 11, Chinese Lovage water, Akebia Trifoliata Stem Extract, **Orchid Extract**, Fagus Slyvatica (beech bud) Extract

Product Name: Innisfree Orchid Skin (orchid extracts found in most of this range)
Marketer: Innisfree Corporation, 6th floor, East Wing, Signature Towers 100, Cheonggyecheon-ro, Jung-gu, Seoul, South Korea. Email: support_world@innisfree.co.kr
Ingredients: Water, propanediol, alcohol, Glycereth-26, Glycerin, arbutin, adenosine, **orchid extract**, camellia sinensis leaf extract, Camellia japonica leaf extract, Opunti coccinellifera fruit extract, citrus unshiu peel extract, butylenes glycol, glyceryl polymethacrylate, BIS-PEG-18 methyl ether dimethyl silane, sodium methyl stearoyl taurate, acrylates/C10-30, Alkyl acrylate crosspolymer, ammounium acryloyldimethyltaurate/VP copolymer, dimethicone, ethylhexyglycerin, octyldodeceth-16, phenyl trimethicone, potassium hydroxide, PEG-60 hydrogenated castor oil, hydrogenated lecithin, disodium EDTA, fragrance

Product name: Innisfree Jeju Orchid Enriched Cream
Marketer: Innisfree Corporation, 6th floor, East Wing, Signature Towers100, Cheonggyecheon-ro, Jung-gu, Seoul, South Korea. Email: support_world@innisfree.co.kr
Ingredients: Water, Cyclopentasiloxane, Propanediol, Glycerin, Cyclohexasiloxane, PEG-10 Dimethicone, Squalane, Arbutin, Phenyl Trimethicone, Disteardimonium Hectorite, Adenosine, **Orchid Extract**, Tangerine Peel Extract, The green Tea Extract, Prickly Pear Extract, Camellia Leaf Extract, Pea Extract, 1,2-Hexanediol, Dimethicone, Dimethicone/Phenyl Vinyl Dimethicone Crosspolymer, Lauryl PEG-9 Polydimethylsiloxyethyl Dimethicone, Sodium Chloride, Ethylhexylglycerin, Kaolin, Polysilicone-11, Disodium EDTA, **Fragrance (Jeju Orchid Extract 250mg)**

Product name: Innisfree Real Rose Mask

Marketer: Innisfree Corporation, 6th floor, East Wing, Signature Towers100, Cheonggyecheon-ro, Jung-gu, Seoul, South Korea. Email: support_world@innisfree.co.kr

Ingredients: Glycerin, Water, Diglycerin, Alcohol, Cetearyl Olivate, Sorbitan Olivate, Rosa Gallica Flower Powder, Carbomer,Citric Acid, Pelargonium Graveolens Flower Oil, Tromethamine, Rosa Damascena Flower Water, Ethylhexylglycerin, Citrus Unshiu Peel Extract, **Orchid Extract**, Camellia Sinensis Leaf Extract, Camellia Japonica Leaf Extract, Opuntia Coccinellifera Fruit Extract, Dextrin, Theobroma Cacao (Cocoa) Extract, Butylene Glycol, 1,2-Hexanediol, Phenoxyethanol

Product Name: Live Clean Fresh Face Soothing Daily Moisturizer and Live Clean Foaming Daily Cleanser
Marketer: *Belvedere International* Inc., 5675 Keaton Crescent, Mississauga, Ontario L5R 3G3, Canada. Tel: +1 905-568-0700 Website: http://www.belvint.com/
Ingredients: Botanical Orchid-C Complex™ is a powerful combination of: **Orchid extract**, Vitamin C and Certified Organic Botanicals

Product Name: Sister Diary Mucin Peptide Mask
Marketer: None found
Ingredients: Water, 1,3-Butylene Glycol, Jojoba Wax PEG-120 Ester, Chondrus Crispus Extract, Xanthan Gum, Helichrysum Italicum Extract, Hydrolyzed Silk, Saccharide Isomerate, Phenoxyethanol, Chlorphenesin, Soluble Collagen, Palmitoyl Tripeptide-3 / Glycerin, Acetyl Hexapeptide-8, Dipotassium Glycyrrhizinate, **Orchid Extract**.

Product Name: Mandara Spa Oriental Retreat Honey Bath with Cedarwood & Sweet Orange
Marketer: Elemis and Bliss Spa.
Ingredients: Aqua/Water/Eau, Sodium Lauroyl Sarcosinate, Acrylates Copolymer, Cocamidopropyl Betaine, PEG-18 Glyceryl Oleate/Cocoate, Glycerin, Inulin, Glycol Distearate, Fragrance (Parfum), Polysorbate 20, Sodium Hydroxide, Sodium Chloride, Laureth-4, Benzophenone-3, Mel/Honey/Miel, Citric Acid, Disodium EDTA, Butylene Glycol, Citrus Aurantium Dulcis (Orange) Peel Oil, Limonene, Linalool, Triethylene Glycol, Cupressus Funebris (Cedarwood) Wood Oil, Coumarin, Benzyl Alcohol, Lactic Acid, Propylene Glycol, **Orchid Extract**, Caramel, Capsicum Annuum Fruit Extract, PEG-40 Hydrogenated Castor Oil, Trideceth-9,Oryza Sativa (Rice) Bran Extract, Oryza Sativa (Rice) Germ Oil, Sine Adipe Lac, Methylisothiazolinone, Cuminum Cyminum (Cumin) Seed Extract, Helianthus Annuus (Sunflower) Seed Oil

Product Name: Etude House Skin (malgam) Smoother (Exfoliation Toner)

Marketer: Etude House, Signiture Tower 4F 100 Junggu, Seoul, South Korea Website: http://www.etudehouse.com/

Ingredients:

Ingredients: WATER ALCOHOL DIPROPYLENE GLYCOL GLYCERIN PEG-8 CITRUS MEDICA LIMONUM (LEMON) FRUIT EXTRACT CITRUS AURANTIUM DULCIS (ORANGE) FRUIT EXTRACT VACCINIUM MYRTILLUS FRUIT/LEAF EXTRACT ACER SACCHARUM (SUGAR MAPLE) EXTRACT SACCHARUM OFFICINARUM (SUGAR CANE) EXTRACT CITRUS GRANDIS (GRAPEFRUIT) PEEL EXTRACT PANTHENOL ORCHID EXTRACT CAMELLIA SINENSIS LEAF EXTRACT CAMELLIA JAPONICA LEAF EXTRACT OPUNTIA COCCINELLIFERA FRUIT EXTRACT CITRUS UNSHIU PEEL EXTRACT CELLULOSE GUM ETHYLHEXYLGLYCERIN XANTHAN GUM POLYSORBATE 20 PEG-60 HYDROGENATED CASTOR OIL DISODIUM EDTA PHENOXYETHANOL FRAGRANCE

Product Name: Herbivore Orchid Facial Oil

Marketer: Herbivore Botanicals, Seattle, USA Email: info@herbivorebotanicals.com and press@herbivorebotanicals.com

Ingredients: Orchid extract

The following finished products were also identified citing only “Orchid Extract” in the ingredients lists (source - Cosmetic-Ingredients 2017 Website: http://www.cosmetic-ingredients.net/).

Darphin Arovita Eye And Lip Contour Gel (Eye Treatment)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Water, Simmondsia Chinensis (Jojoba) Seed Oilpropylene Glycol, Glyceryl Polymethacrylate, Glycyrrhetinic Acid, Vanilla Planifolia (Orchid) Fruit Extract, Centaurea Cyanus Flower Extract, Chamomilla Recutita (Matricaria) Extract, Rosmarinus Officinalis (Rosemary) Leaf Extract, Tilia Cordata Flower Extract, Rosa Centifolia Flower Extract, Glycine Soja (Soybean) Oil Unsaponifiables, Persea Gratissima (Avocado) Oilunsaponifiables, Triethanolamine, Polysorbate 60, Carbomer, Tetrasodium Edta, Sodium Dehydroacetate, Sorbitol, Phenoxyethanol, Methylparaben, Butylparaben, Ethylparaben, Propylparaben, Isobutylparaben, Fragrance

Cosme Decorte AQ Vitalizing Lotion Extra Rich (Moisturizer)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Water, Butylene Glycol, Glycerin, Methyl Gluceth-10, Betula Platyphylla Japonica Juice, Alcohol, Disodium Adenosine Triphosphate, Orchid Extract, Rice Bran Extract, Perilla Ocymoides Leaf Extract, Birch Bark Extract, Poria Cocos Extract, Disodium Edta, Peg-50 Hydrogenated Castor Oil Isostearate, Oleyl Alcohol, Cholesterol, Menthol, Sodium Hydroxide, Hydrogenated Lecithin, Methylparaben, Fragrance

Cosme Decorte Micro-Performance Cyto Tensor (Moisturizer)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Water, Dipropylene Glycol, Oleyl Oleate, Glycerin, Propylene Glycol, Dicaprate, Alcohol, Cetearyl Alcohol, Dimethicone, Butylene Glycol, Dipentaerythrityl, Hexahydroxystearate/Hexastearate/Hexarosinate, Butyrospermum Parii (Shea Butter), Centella Asiatica Extract, Glucose, Orchid Extract, Serine, Tocopherol, Yeast Extract, Acrylates/C10-30 Alkyl Acrylate Crosspolymer, Ceramide 2, Cholesteryl Hydroxystearate, Chondrus Crispus (Carrageenan), Disodium Edta, Isostearic Acid, Peg-60 Hydrogenated Castor Oil, Stearic Acid, Sucrose Mortierellate, Triethanolamine, Xanthan Gum, Butylparaben, Ethylparaben, Isobutylparaben, Methylparaben, Phenoxyethanol, Propylparaben, Fragrance, Mica, Titanium Dioxide (Ci77891), Red33 (Ci17200), Yellow10 (Ci47005)

Cosme Decorte Moisture Liposome (Treatment)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Water, Butylene Glycol, Glycerin, Hydrogenated Lecithin, Acetyl Glutamin, Betula Alba Bark Extract, Ditrus Medica Limonum (Lemon Extract), Equisetum Arvense Extract, Humulus Lupulus (Hops) Extract, Orchid Extract, Pinus Sylvestris Cone Extract, Rosmarinus Officinalis(Rosemary) Leaf Extract, Sodium Hyaluronate, Sodium Pca, Tocopherol, Alcohol, Benzophenone-5, Carbomer, Cholesterol, Ethylhexyl Methoxycinnamate, Sodium Hydroxide, Xanthan Gum,methylparaben, Fragrance

Cosme Decorte White-Science Lotion Concentrate (Moisturizer)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Water, Butylene Glycol, Glycerin, Alcohol, Arbutin, Chamaecyparis Obtusa Water, Coffea Arabica (Coffee) Seed Extract, Disodium Adenosine Triphosphate, Glycyrrhiza Glabra (Licorice) Root Extract, Lonicera Caerulea Fruit Juice, Myrciaria Dubia Fruit Extract, Orchid Extract, Cholesterol, Citric Acid, Dimethicone, Hydrogenated Lecithin, Pentasodium Pentetate, Sodium Citrate, Squalane, Sucrose Mortierellate, Trilaureth-4 Phosphate, Methylparaben,

Hollywood Flawless Cleansing Oil (Cleanser)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Triethylhexanoin, Octyl Palmitate, Peg-20 Glyceryl Triisostearate, Mineral Oil, Diisostearyl Malate, Cetyl Ethylhexanoate, Octyldodecyl Lauroyl Glutamate, Phenyl Trimethicone, Orchid Extract, Calendula Officinalis Flower Extract, Macadamia Ternifolia Seed Oil, Limnanthes Alba (Meadowfoam) Seed Oil, Tocopheryl Acetate, Butylene Glycol, Water, Fragrance

Hollywood Flawless Skin Freshner (Toner)

Product description: n/a

Anti-aging:	Hydrating:	Drying:
Anti-inflammatory:	Whitening:	Irritating:
Anti-oxidant:	Exfoliating:	Comedogenic:

Water, Alcohol, Butylene Glycol, Orchid Extract, Calendula Officinalis Flower Extract, Dipotassium Glycyrrhizate, Niacinamide, Citric Acid, Sodium Citrate, Ppg-6-Decyltetradeceth-30, Polyglyceryl-10 Laurate, Methylparaben, Fragrance

Kanebo Twany Baby Lipid Wear N (Moisturizer)

Anti-aging: Hydrating: Drying:
Anti-inflammatory: Whitening: Irritating:
Anti-oxidant: Exfoliating: Comedogenic:

Water, Phytosteryl Macadamiate, Hydrogenated Polydecene, Sorbitol, Dipropylene Glycol, Glycerin, Triisostearin, Simmondsia Chinensis (Jojoba) Seed Oil, Butylene Glycol, Macadamia Ternifolia Seed Oil, Cetyl Palmitate, Behenyl Alcohol, Hydrogenated Lecithin, Phytosteryl/Isostearyl/Cetyl/Stearyl/Behenyl Dimer Dilinoleate, Sodium Isostearate, Carbomer, Disodium Glycyrrhizate, Argania Spinosa Kernel Oil, Xanthan Gum, Rice Ferment Filtrate (Sake), Squalane, Ceramide 2, Tocopheryl Nicotinate, Methylserine, Sodium Palmitate, Isostearic Acid, Sphingomonas Ferment Extract, Palmitic Acid, Tremella Fuciformis Polysaccharide, Sodium Hyaluronate, Olea Europaea (Olive) Leaf Extract, Orchid Extract, Crataegus Cuneata Fruit Extract, Camellia Sinensis Seed Extract, Camellia Japonica Seed Extract, Hypericum Perforatum Extract, Abelmoschus Esculentus Fruit Extract, Edta, Phenoxyethanol, Parabens, Fragrance

Kanebo Twany Esthetude Deep Wash Soap (Cleanser)

Anti-aging: Hydrating: Drying:
Anti-inflammatory: Whitening: Irritating:
Anti-oxidant: Exfoliating: Comedogenic:

Water, Potassium Myristate, Glycerin, Myristic Acid, Potassium Stearate, Glyceryl Stearate Se, Sodium Palmoyl Glutamate, Stearic Acid, Kaolin, Titanium Dioxide, Ceteth-20, Microcrystalline Cellulose, Ricinus Communis (Castor) Seed Oil, Butylene Glycol, Carbomer, Raffinose, Prunus Armeniaca (Apricot) Juice, Alcohol, Microcrystalline Wax, Dipotassium Glycyrrhizate, Methylserine, Soybean Milk Culture Filtrate, Olea Europaea (Olive) Leaf Extract, Citrus Junos Fruit Extract, Camellia Sinensis Seed Extract, Camellia Japonica Seed Extract, Orchid Extract, Oenothera Biennis Seed Extract, Hypericum Perforatum Extract, Pinus Sylvestris Cone Extract, Edta, Ultramarines

Kanebo Silver Elixir Night (Treatment)

Anti-aging: Hydrating: Drying:
Anti-inflammatory: Whitening: Irritating:
Anti-oxidant: Exfoliating: Comedogenic:

Water, Alcohol, Vegetable Glycerin, Algae, Salvia Officinalis (Sage), Equisetum Arverse (Field Horsetail), Alchemilla Vulgaris (Lady's Mantle), Lamium Album (White Dead Nettle), Viola Tricolor (Wild Pansy), Sorbic Acid, Argentum Potabile (Liquid Silver), Argentum Citricum, Jasminum Grandiflorum (White Jasmin), Vanilla Planifolia (Vanilla Orchid), Foeniculum Vulgare (Florentine Fennel), Essence Of White Pearls

No Image Available

Kanebo Twany Esthetude Mild Conditioner (Moisturizer)

Anti-aging: Hydrating: Drying:
Anti-inflammatory: Whitening: Irritating:
Anti-oxidant: Exfoliating: Comedogenic:

Water, Dipropylene Glycol, Butylene Glycol, Peg-20, Glycerin, Maltitol, Methyl Gluceth-20, Raffinose, Sodium Citrate, Dimethicone Copolyol Methyl Ether, Peg-60 Hydrogenated Castor Oil, Citric Acid, Allantoin, Polyquaternium-51, Peony (Paeonia Albiflora) Root Extract, Sodium Hyaluronate, Camellia Sinensis Seed Extract, Camellia Japonica Seed Extract, Methylserine, Coix Lacryma-Jobi (Job's Tears) Seed Extract, Orchid Extract, Licorice (Glycyrrhiza Glabra) Extract, Abelmoschus Esculentus Fruit Extract, Genothera Biennis Seed Extract, Japanese Angelica Root Extract, Rehmannia Chinensis Extract, Cnidium Officinale Root Extract, Phenoxyethanol

Kanebo Twany Pure Natural Lotion II (Toner)

Anti-aging: Hydrating: Drying:
Anti-inflammatory: Whitening: Irritating:
Anti-oxidant: Exfoliating: Comedogenic:

Water, Dipropylene Glycol Dimethyl Ether, Glycerin, Butylene Glycol, Sorbitol, Peg-75, Polysorbate 20, Peg-60 Hydrogenated Castor Oil, Dipotassium Glycyrrhizate, Methylserine, Lysolecithin, Disodium Phosphate, Ethylhexyl Methoxycinnamate, Orchid Extract, Buddleja Davidi Extract, Olea Europaea (Olive) Leaf Extract, St. Johnswort (Hypericum Perforatum) Extract, Abelmoschus Esculentus Fruit Extract, Tropaeolum Majus Flower Extract, Edta, Phenoxyethanol

Paul & Joe Eye Treatment Cream (Eye Treatment)

Anti-aging:		Hydrating:		Drying:	
Anti-inflammatory:		Whitening:		Irritating:	
Anti-oxidant:		Exfoliating:		Comedogenic:	

Water (Aqua), Butylene Glycol, Glycerin, Limnanthes Alba (Meadowfoam) Seed Oil, Cetearyl Alcohol, Cetyl Palmitate, Mineral Oil, Phytosteryl/Behenyl/Octyldodecyl Lauroyl Glutamate, Polyglyceryl-2 Triisostearate, Behenyl Alcohol, Euphorbia Cerifera (Candelilla) Wax, Hydrogenated Polyisobutene, Beeswax, Serine, Aesculus Hippocastanum (Horse Chestnut) Seed Extract, Chamomilla Recutita (Matricaria) Extract, Citrus Aurantium Dulcis (Orange) Flower Water, Citrus Aurantium Dulcis (Orange) Oil, Citrus Grandis (Grapefruit) Fruit Extract, Lilium Candidum Bulb Extract, Orchid Extract, Potentilla Erecta Root Extract, Rosa Multiflora Fruit Extract, Rosa Rugosa Flower Extract, Sambucus Nigra Flower Extract, Sodium Pca, Dimethicone, Disodium Edta, Hydrogenated Lecithin, Sodium Lactate, Sodium Methyl Stearoyl Taurate, Xanthan Gum, Methylparaben

Polgantong Base of Base Satin Pink SPF 25/PA++ (Makeup)

Anti-aging:		Hydrating:		Drying:	
Anti-inflammatory:		Whitening:		Irritating:	
Anti-oxidant:		Exfoliating:		Comedogenic:	

Water, Cyclomethicone, Diphenylsiloxy Phenyl Trimethicone, Butylene Glycol, Titanium Dioxide, Cyclopentasiloxane, Zinc Oxide, Cetyl Peg/Ppg-10/1 Dimethicone, Arbutin, Glycerin, Sodium Chloride, Mica, Hexyl Laurate, Polyglyceryl-4 Isostearate, Dimethicone, Sorbitan Isostearate, Dimethicone/Vinyl Dimethicone Crosspolymer, Ozokerite, Sorbitan Olivate, Aluminum Hydroxide, Disteardimonium Hectorite, Butylene Glycol Dicaprylate/Dicaprate, Stearic Acid, Tocopheryl Acetate, Propylparaben, Talc, Cynara Scolymus (Artichoke) Leaf Extract, Orchid Extract, Citrus Aurantium Amara (Bitter Orange) Flower Extract, Rosmarinus Officinalis (Rosemary) Leaf Extract, Lilium Candidum Bulb Extract, Calcium Stearate, Methylparaben, Chlorphenesin, Propylene Carbonate, Dimethicone/Methicone Copolymer, Triethoxycaprylylsilane, Adenosine, Disodium Edta, Sodium Hyaluronate, Iron Oxides

Polgantong Base of Base Satin Yellow SPF 25/PA++ (Makeup)

Anti-aging:		Hydrating:		Drying:	
Anti-inflammatory:		Whitening:		Irritating:	
Anti-oxidant:		Exfoliating:		Comedogenic:	

Water, Cyclomethicone, Diphenylsiloxy Phenyl Trimethicone, Butylene Glycol, Titanium Dioxide, Cyclopentasiloxane, Zinc Oxide, Cetyl Peg/Ppg-10/1 Dimethicone, Arbutin, Glycerin, Sodium Chloride, Mica, Hexyl Laurate, Polyglyceryl-4 Isostearate, Dimethicone, Sorbitan Isostearate, Dimethicone/Vinyl Dimethicone Crosspolymer, Ozokerite, Sorbitan Olivate, Aluminum Hydroxide, Disteardimonium Hectorite, Butylene Glycol Dicaprylate/Dicaprate, Stearic Acid, Tocopheryl Acetate, Propylparaben, Talc, Cynara Scolymus (Artichoke) Leaf Extract, Orchid Extract, Citrus Aurantium Amara (Bitter Orange) Flower Extract, Rosmarinus Officinalis (Rosemary) Leaf Extract, Lilium Candidum Bulb Extract, Calcium Stearate, Methylparaben, Chlorphenesin, Propylene Carbonate, Dimethicone/Methicone Copolymer, Calcium Aluminum Borosilicate, Triethoxycaprylylsilane, Adenosine, Disodium Edta, Sodium Hyaluronate

Polgantong Base of Base White Pearl SPF 25/PA++ (Makeup)

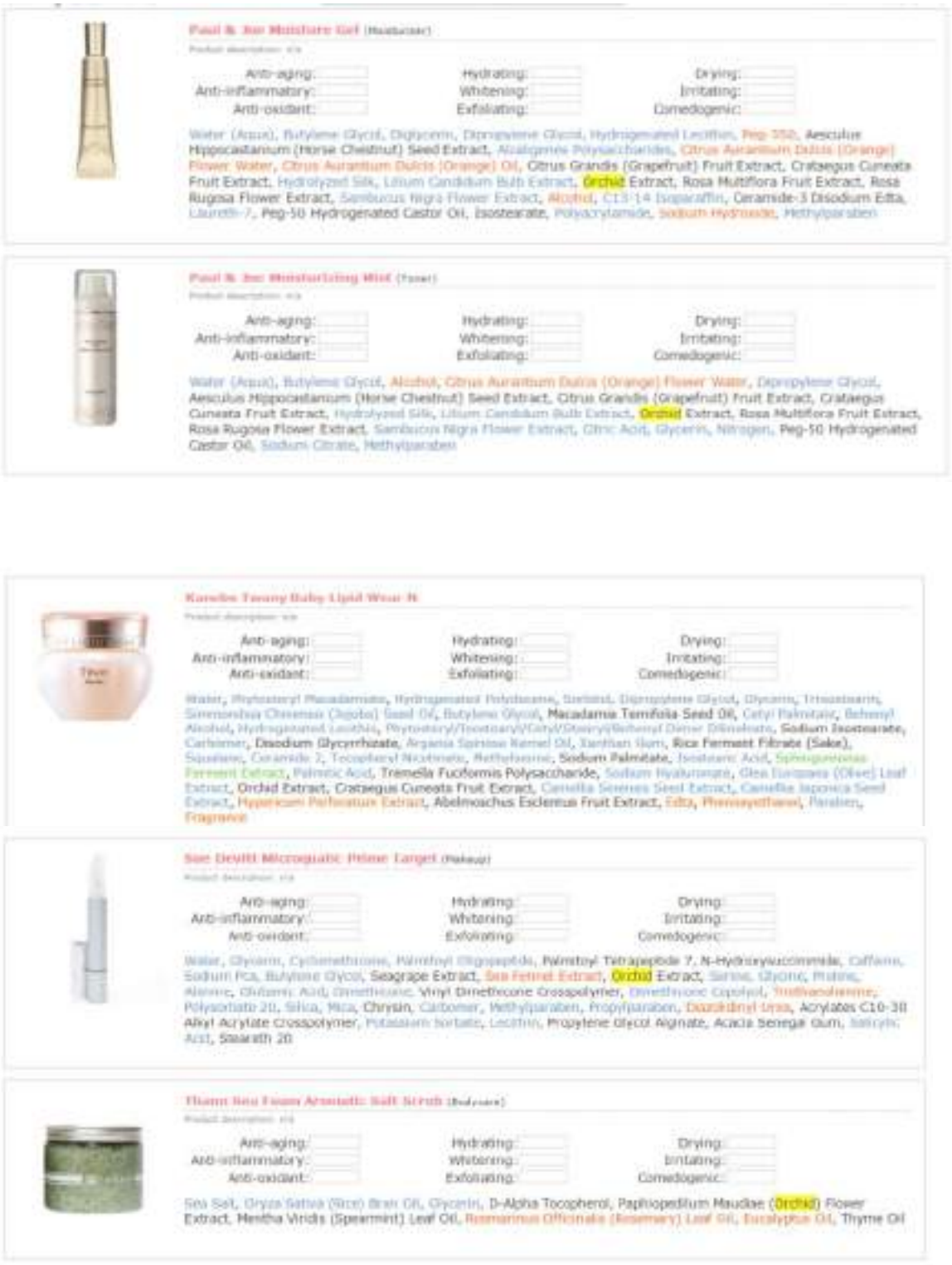
Anti-aging:		Hydrating:		Drying:	
Anti-inflammatory:		Whitening:		Irritating:	
Anti-oxidant:		Exfoliating:		Comedogenic:	

Water, Cyclomethicone, Diphenylsiloxy Phenyl Trimethicone, Butylene Glycol, Titanium Dioxide, Cyclopentasiloxane, Zinc Oxide, Cetyl Peg/Ppg-10/1 Dimethicone, Arbutin, Glycerin, Sodium Chloride, Mica, Hexyl Laurate, Polyglyceryl-4 Isostearate, Dimethicone, Sorbitan Isostearate, Dimethicone/Vinyl Dimethicone Crosspolymer, Ozokerite, Sorbitan Olivate, Aluminum Hydroxide, Disteardimonium Hectorite, Butylene Glycol Dicaprylate/Dicaprate, Stearic Acid, Tocopheryl Acetate, Propylparaben, Talc, Cynara Scolymus (Artichoke) Leaf Extract, Orchid Extract, Citrus Aurantium Amara (Bitter Orange) Flower Extract, Rosmarinus Officinalis (Rosemary) Leaf Extract, Lilium Candidum Bulb Extract, Calcium Stearate, Methylparaben, Chlorphenesin, Propylene Carbonate, Dimethicone/Methicone Copolymer, Triethoxycaprylylsilane, Adenosine, Disodium Edta, Sodium Hyaluronate, Iron Oxides

Paul & Joe Eye Treatment Cream (Eye Treatment)

Anti-aging:		Hydrating:		Drying:	
Anti-inflammatory:		Whitening:		Irritating:	
Anti-oxidant:		Exfoliating:		Comedogenic:	

Water, Butylene Glycol, Glycerin, Limnanthes Alba (Meadowfoam) Seed Oil, Cetearyl Alcohol, Cetyl Palmitate, Mineral Oil, Cholesteryl/Behenyl/Octyldodecyl Lauroyl Glutamate, Polyglyceryl-2 Triisostearate, Euphorbia Cerifera (Candelilla) Wax, Behenyl Alcohol, Hydrogenated Polyisobutene, Sodium Pca, Orchid Extract, Orange Flower Water, Citrus Aurantium Dulcis (Orange) Oil, Chamomilla Recutita (Matricaria) Extract, Citrus Grandis (Grapefruit) Fruit Extract Citrus Paradisi (Grapefruit) Fruit Extract, Sambucus Nigra Flower Extract, Serine, Potentilla Erecta Root Extract, Rosa Multiflora Fruit Extract, Rosa Rugosa Flower Extract, Aesculus Hippocastanum (Horse Chestnut) Extract, Lilium Candidum Bulb Extract, Disodium Edta, Alcohol, Xanthan Gum, Sodium Methyl Stearoyl Taurate, Beeswax, Hydrogenated Lecithin, Sodium Lactate, Methylparaben



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Case study on *Dactylorhiza* and *Orchis* species used in the cosmetic and personal care industries.

Commissioned by
Federal Food Safety and Veterinary Office FSVO
CITES Management Authority of Switzerland and Lichtenstein

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April 2019

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Summary

Following the quick summaries included in PC24. Doc 28 of orchids used in cosmetic and personal care products, a more detailed analysis has been carried out on species identified by this industry as 'Orchis'. This includes three species in three genera: *Anacamptis morio* (synonym *Orchis morio*), *Dactylorhiza maculata* (synonym *Orchis maculata*), and *Orchis mascula*. Species from all three genera are widely and unsustainably harvested from the wild for the manufacture of salep (see overview in PC23.32). However, for use in the cosmetic and personal care industry the three species named above have been identified as the main species used in what the industry calls 'orchid extract.' They appear to be artificially propagated, mainly in Belgium, and traded as 'extract' with *Orchis mascula* by far the largest species in trade under this term. The total amount of exported *Orchis mascula* extracts is 75,691kg over the ten year period covered by this report (2007-17), with India and France being the largest exporters; however the amount reported by importers totals only 28.37kg for all countries combined. This discrepancy confirms previous analysis indicating that it is unlikely that the full trade is documented or legal. This may be due to the misinterpretation or lack of knowledge of CITES among industry, deliberate circumvention of CITES regulations, poor knowledge of orchid extracts in cosmetics by CITES policy and enforcement authorities and the burden placed on both Parties and industry to comply with CITES implementation given the large quantities of commodities in trade.

While it is evident that exports from France and Belgium are being used in the cosmetic and personal care industries and appear to be propagated artificially, it seems that the majority of exports from India are being used medicinally and nutritionally, with some cosmetic use, and there is a possibility that species used may be harvested from the wild. There are reports that *Orchis* species are harvested from the wild in countries like Iran, as well as northern Pakistan, Afghanistan and Nepal, and are then traded over the border with India (de Boer, pers. comm November 2018). The majority of Indian exports are destined for the Middle East, and since 2014 have all come under the term medicinal. To date, no responses have been received from Indian companies regarding the source of the extracts and research is still ongoing.

As identified in the previous case studies there are several large pharmaceutical and/or cosmetic and personal care companies manufacturing both extracts and finished products of these species based in the USA; it has proved difficult to either track this trade or engage with the companies involved. Further outreach to these US based companies is necessary in order to fully understand the trade flow of finished products containing parts and derivatives of this and other orchid genera.

The support of the working group in reaching out to both their national trade associations and extraction companies, particularly in India, the US and the Asian range States would be of great benefit in the understanding of this trade and the possible conservation consequences to orchid species in the wild.

Background

This report is part of a series of case studies that are being undertaken to determine the effects of an exemption of finished cosmetic products containing orchid parts and derivatives on the conservation of the species in the wild. Based on the documents "*Quick Scan of Orchidaceae species in European commerce as components of cosmetic, food and medicinal products,* Brinckmann, 2014" and "*General study on orchids used in the cosmetic and personal care industry*,

Groves and Rutherford, 2018", it appears that one *Dactylorhiza* species and two *Orchis* species are used as ingredients in the cosmetic and personal care industries.

Taxonomy

The World Checklist of Selected Plant Families (WCSP) lists 45 accepted *Dactylorhiza* species and 74 hybrids, with various subspecies and variations. Mabberley (2008) lists 30 species in Eurasia and mentions that the species in Alaska, the Mediterranean and Macaronesia hybridize and that there is no well-defined reproductive isolation. For the genus *Orchis* 21 accepted species and 37 hybrids are listed, also with numerous subspecies and variations (WCSP, 2019).

Dactylorhiza maculata

Botanical name:	*Dactylorhiza maculata* (L.) Soó is an accepted name (WCSP, 2019).
Synonym:	*Orchis maculata* L.
Subspecies:	*D. maculata* subsp. *battandieri* (Raynaud) H.Baumann & Künkele *D. maculata* subsp. *caramulensis* Verm. *D. maculata* subsp. *elodes* (Griseb.) Soó *D. maculata* subsp. *ericetorum* (E.F.Linton) P.F.Hunt & Summerh. *D. maculata* subsp. *islandica* (Á.Löve & D.Löve) Soó *D. maculata* subsp. *maculata* *D. maculata* subsp. *podesta* (Landwehr) Kreutz in C.A.J.Kreutz & H.Dekker *D. maculata* subsp. *savogiensis* (D.Tyteca & Gathoye) Kreutz *D. maculata* subsp. *transsilvanica* (Schur) Soó
Common names:	Spotted orchid (English); Gefleckte Knabenkraut (German); Orchis tacheté (French); Orquídea moteada de los pantanos (Spanish).

Orchis mascula

Botanical name:	*Orchis mascula (L.) L.* is an accepted name (WCSP, 2019).
Subspecies:	*O. mascula* subsp. *ichnusae* Corrias *O. mascula* subsp. *laxifloriformis* Rivas Goday & B.Rodr. *O. mascula* subsp. *mascula* *O. mascula* subsp. *scopulorum* (Summerh.) H.Sund. ex H.Kretzschmar, Eccarius & H.Dietr. *O. mascula* subsp. *speciosa* (Mutel) Hegi.
Common names:	Early-purple orchid (English); Männliches Knabenkraut (German); Orchis mâle (French); Orquídea púrpura (Spanish); 強壯紅門蘭(Chinese); アーリー・パープル・オーキッド(Japanese); ятрышник мужской (Russian).

Orchis morio

Botanical name:	*Orchis morio L.* is a synonym of *Anacamptis morio* (L.) R.M.Bateman, Pridgeon & M.W.Chase (WCSP, 2019).
Subspecies:	*A. morio* subsp. *caucasica* (K.Koch) H.Kretzschmar, Eccarius & H.Dietr. *A. morio* subsp. *champagneuxii* (Barnéoud) H.Kretzschmar, Eccarius & H.Dietr. *A. morio* subsp. *longicornu* (Poir.) H.Kretzschmar, Eccarius & H.Dietr. *A. morio* subsp. *morio*. *A. morio* subsp. *picta* (Loisel.) Jacquet & Scappat. *A. morio* subsp. *syriaca* (E.G.Camus) H.Kretzschmar, Eccarius & H.Dietr.
Common names:	Green-winged orchid (English); Kleines Knabenkraut (German); Orchis bouffon (French);

Distribution

Species in the genus *Anacamptis* are distributed throughout Europe and the Mediterranean to Central Asia, *Dactylorhiza* species can be found in the subarctic regions and the temperate Northern hemisphere and *Orchis* species in Macaronesia, the Mediterranean and from Europe to Mongolia. *Anacamptis morio* (*Orchis morio*) is distributed in Europe and the Mediterranean to Iran; *Dactylorhiza maculata* can be found from North-Western Africa and Europe to Central Siberia, with the subspecies *elodes* and *maculata* being most wide-spread; *Orchis mascula* is distributed in Macaronesia, and from Northern and Central Europe to Iran. The subspecies *mascula* is wide-spread, whereas the other subspecies have a restricted range convicted to specific islands or mountainous areas (WCSP, 2019).

Appearance

All species within the genera *Anacamptis, Dactylorhiza* and *Orchis* are tuber geophytes, have erect stems and inflorescences with spikes of mostly red or purple and in some cases white or green flowers. *Anacamptis* and *Orchis* species have two rounded tubers, whereas tubers from *Dactylorhiza* species are split into finger-like lobes. *Anacamptis* and *Orchis* species have historically largely been grouped together in the genus *Orchis* due to their morphological similarities and it has been because of recent molecular studies that several *Orchis* species have been transferred to the genus *Anacamptis* (Bateman et al., 1997). *Anacamptis morio* and *Orchis mascula* bloom around the same time and have a similar appearance, but *Anacamptis morio* can be identified by the green veins in the wings of the flowers.

Horticultural, medicinal and food uses

Several species of *Anacamptis*, *Dactylorhiza* and *Orchis* as well as other terrestrial orchids are used in Asia minor, the Middle East and eastern Mediterranean for a traditional delicacy called *salep* (Kasparek and Grimm, 1999; Ece Tamer et al., 2006; Ghorbani et al., 2014b; Kreziou et al., 2015). A recent study in Iran found that the species most commonly used for *salep* are *Orchis simia*, *Anacamptis palustris*, an unidentified *Dactylorhiza* species and an unidentified *Ophrys* species, but the use of *Anacamptis morio* and *Orchis mascula* have also been recorded (Ghorbani et al., 2016). Trade in *salep* orchids is considered highly unsustainable; annually up to 130 million wild orchids are harvested from the wild to supply the demand (Ghorbani et al., 2014a; Kreziou et al., 2015).

Dactylorhiza hatagirea, which is distributed in the Himalayan region, is used in traditional Ayurvedic, Siddha and Unani medicine to treat a multitude of ailments ranging from dysentery to cuts and burns. It also serves as an aphrodisiac, which is frequently mentioned on online platforms that offer this orchid. Additionally, it is reported that this orchid is used in silk sizing in the Kashmir region (Pant and Rinchen, 2012). *Anacamptis pyramidalis* is used as folk medicine in Croatia and Turkey and an unidentified *Orchis* species is reported to be used medicinally in Greece (Vokou et al., 1993; MPSG, 2014). *Orchis mascula* as extract is exported by India in large numbers, but it was not possible to identify the end use of this extract; the majority is reported under the term 'medicinal'.

Horticulturally, terrestrial orchids are considered to be more challenging to cultivate than epiphytic orchids. However there are several nurseries that offer *Dactylorhiza* and *Orchis* species in their 'hardy orchids' section. *Dactylorhiza* species are advertised as easy to grow and are marketed as beginner orchids, whereas *Orchis* species are recommended for people with a certain degree of expertise. *Dactylorhiza* and *Orchis* species are offered by a number of specialized nurseries in, amongst others, Belgium, the Netherlands, the UK and Japan.

It appears that some trade in *Anacamptis*, *Dactylorhiza* and *Orchis* species is taking place on online sales platforms such as Amazon, Ebay, Etsy and Indiamart. Tubers or ground tubers are offered as *salep*, whereas occasionally tubers or live plants are offered for horticultural or medicinal purposes. These tubers are offered by companies located in Greece, India and Romania, who are possibly unaware of the trade restrictions on these plants. Additionally several European countries report occasional to regular illegal uprooting of rare *Anacamptis*, *Dactylorhiza* and *Orchis* species in their local newspapers. The Swedish islands of Gotland and especially Öland are targeted on a regular basis and have reported a mass-loss of hundreds of *Dactylorhiza sambucina* individuals – most likely used for medicinal purposes. In the Netherlands orchid theft is also reported, but here it concerns only a few individual plants.

Cosmetic and personal care use

The use of *Dactylorhiza* and *Orchis* species as food and medicine dates back hundreds of years, whereas their use in the cosmetic and personal care industries is much more recent. The earliest records for trade in *Orchis* derivatives and extracts in the CITES trade database date from 2008 and cosmetics from 2016. *Dactylorhiza* extracts have been recorded in the trade database from 2014. There appears to be an growing interest in the use of natural orchid extracts from species within these genera; their properties are advertised as being beneficial for use in hair-conditioning, masking, perfuming, soothing and skin-conditioning components of cosmetic products (Brinckmann, 2014). Properties attributed to the active compounds in these orchids (anthocyanins, polyphenols, glucomannan, mucilage) range from anti-inflammatory, anti-oxidative, and astringent to emollient and soothing and companies promote the use of their extracts as additive in moisturizing creams, baby care products, body lotions and milks, face masks, hair conditioners and products for tissue application and softening (CRODAROM, 2013; FSS, 2014a).

Methods of extraction for cosmetic and personal care products

There are various extraction processes for orchid species, as reported in previous case studies. One common method of extraction for *Dactylorhiza* and *Orchis* species is microwave extraction in water and glycerine (Groves and Rutherford, 2017), but not much information is available on the specifics of this process, such as which plant parts are used and in what quantities. There are information sheets available from companies offering *Orchis mascula* extract (Crodarom, France) and *Orchis* (*Dactylorhiza*) *maculata* extract (Formulator Sample Shop, USA) and both mention using microwave extraction as part of the manufacturing process. One of these sheets describes that the compounds of interest are derived from multiple plant parts (cyanidin pigments from the flowers, flavonoids and phenolic acids from the leaves and flowers and glucomannan from the tubers), indicating that the entire plant might be used in the extraction process (CRODAROM, 2013). The data sheets from the Formulator Sample Shop, on the other hand, mentions that their FSS Spotted Orchid Extract contains Orchis Maculata Flower Extract, indicating that only the flowers are used in the extraction process (FSS, 2014a, 2014b). Microwave-assisted extraction requires very little or no solvents, but it appears that (in case of *Orchis maculata*) the marketed extractions are a mixture containing 20% of the actual orchid extract. The composition sections of the two Spotted Orchid Extracts FSS offers each describe in what proportions the orchid extract and solvents are mixed: water (40%), glycerine (40%) and *Orchis maculata* extract (20%) or water (47%), butylene glycol (32,4*%), Orchis maculata* extract (20%) and phenoxyethanol (0,6%).

Trade

For this case study, data were taken from the CITES trade database (2007-17, UNEP-WCMC, 2019) regarding all import and export records of *Anacamptis*, *Dactylorhiza* and *Orchis* species. No trade in *Anacamptis* species was reported in the selected time-period, but *Anacamptis morio* was found listed under its synonym *Orchis morio*. There are significant discrepancies between export and import records for all three genera, as has been reported in case studies on trade in other orchid species. For *Orchis* 1565 export records were listed, opposed to only 123 import records. In the case of *Dactylorhiza* the difference was less extensive with 117 export and 89 import records. It is difficult to determine the exact exported and imported quantities of plant material, since it is unclear what the quantities refer to and sometimes no units are mentioned. It should also be mentioned that there is a substantial reported trade in Orchidaceae spp. and Orchidaceae hybrids traded for commercial purposes, although it remains unclear what genera these plants belong to. As noted in document PC23. Doc 32 there is scope for substantial improvement in reporting methods and terms.

Live plants

Between 2007 and 2017 the CITES trade database reports the export of 6863 live *Dactylorhiza* plants. This trade concerns 9 species, hybrids and undefined *Dactylorhiza* spp., which are reportedly all artificially propagated. Main exporters are Belgium (4215 plants), Canada (2071 plants) and the Netherlands (577 plants). The plants are imported by a variety of countries, but the main importers are Switzerland (4205 plants) and the United states (1688 plants). In total 11586 live *Orchis* plants were traded, most of which were hybrids or undefined species (*Orchis* spp.). Between 2015 and 2017 the trade database lists the export of 9517 artificially propagated *Orchis* hybrids from the Netherlands to various countries, with the Ukraine being the main importer. Japan is the second largest exporter of *Orchis* hybrids, with a reported export of 690 live plants.

Processed material

Cosmetics

There is one record of *Orchis mascula* exported as artificially propagated cosmetics by the UK and imported by Thailand, origin Belgium. It concerns a relatively large quantity of '49968', although no unit is reported; however it is possible that this trade did not take place as there is no corresponding import reported by Thailand. Trade in *Orchis morio* cosmetics is reported in mg and has a cumulative export quantity of 5360mg in 2017, with France being the sole export country. No *Dactylorhiza* species are reported to be traded as cosmetics.

Derivatives

India and France are the largest exporters of *Orchis mascula* derivatives with a reported 9,040.47kg and '5281' (no unit indicated) respectively. In the case of *Orchis morio* the total reported amount of trade in derivatives is 1674kg, 296,8L and a cumulative quantity of '29252', which is unit-less. The trade in *O. morio* derivatives seems to have started in 2013, whereas *O. mascula* derivatives have been reported since 2007. No derivatives of *Dactylorhiza* species are reported to be traded.

Commented [MUB1]: Again India. It is good to mention it and maybe we can send India MA/SC this report.

Extracts

The total amount of exported *Orchis mascula* extracts over the period 2007 - 2017 is 75,691kg; India and France are the largest exporters with a reported export of 43,116kg and 31,745kg respectively. The importer-reported amount of extracts adds up to only 28.37kg for all countries

combined, showing an extensive discrepancy between import and export data. The database reports that nearly 30,000kg of extract was exported by India to Latvia but it could be that this trade did not take place, due to the lack of related import data. The other destinations for Indian exports were the United Arab Emirates and Cyprus. In the case of *Dactylorhiza*, the only species for which trade in extracts was reported was *D. fuchsii*, with a reported trade of 48kg from France to the United States between 2014 and 2016.

Other trade

Dried plants

The only reported trade in dried *Dactylorhiza* plants (reported as dried plants or specimens) is solely for scientific purposes and insignificant when it comes to quantities. The same applies to *Orchis* species, although there seems to be an inaccuracy in the database concerning a shipment of dried plants between Jordan and the UK, where the importer (UK) reports a quantity of 400 for scientific purpose and the exporter (JO) reports a quantity of 8 for trade purposes.

Medicine

An amount of 1030kg and '300' unit-less *Orchis mascula* has been exported by India as medicine, all reported to be artificially propagated (or wrongly listed as bred in captivity).

Roots

In 2011 a large export of 5000 *Dactylorhiza majalis* roots from Belgium to Guernsey was recorded; the only other records are an import of 30 *Dactylorhiza* spp. roots from Japan to Great Britain and an export of one *Dactylorhiza majalis* root from Great Britain to Norway. Between 2007 and 2014 a cumulative export of 9080 *Orchis* roots from Japan was reported, with Great Britain being the main importer (7550 roots). There are only three import entries, one from the Netherlands (10200 roots from Japan), one from France (25 roots from Japan) and one concerning the import of 80 wild-harvested roots sourced from Turkey, being imported from Ireland by Turkey.

Tissue-cultured plants

Two *Dactylorhiza majalis* cultures have been exported from Great Britain to Norway in 2009. No *Orchis* cultures have been reported to be traded between 2007 and 2017.

Confiscated material

Between 2007 and 2010 several confiscations of traded *Orchis mascula* derivatives and extracts from Pakistan and India have taken place, including a large shipment with 18981 derivatives heading from India to Latvia. No *Dactylorhiza* material has been reported to be confiscated in the last ten years.

Sourcing of the plants

Wild harvesting

According to the CITES trade database, only three records of *Dactylorhiza* were reported to be wild-sourced, all for scientific purposes. There are also only three *Orchis* wild-sourced records with one being for scientific purposes and two for commercial purpose. There are clear indications, however, that large amounts (up to 13 million a year) of *Dactylorhiza* and *Orchis* plants are sourced from the wild, although this mainly seems to be for food and medicinal purposes (see: 'Horticultural, medicinal and food uses'). There are also reports that *Orchis* species are harvested

from the wild in countries like Iran, as well as northern Pakistan, Afghanistan and Nepal, and are then traded over the border with India (de Boer, pers. comm November 2018).

Cultivation of live plants

All live traded *Dactylorhiza* and *Orchis* plants are reported to be artificially propagated. The source of the plants is often unclear, as well as the purpose of the trade in live plants -purely horticulture or also for extraction purpose. There are a number of commercial nurseries growing *Dactylorhiza* and/or *Orchis* species and hybrids, some of which are in the main exporting countries of live plants (Belgium, Canada, the Netherlands and Japan). Examples are:

- Albiflora – Crustacare in Belgium: http://albiflora.be/index.php
- Fraser's Thimble Farms in Canada: http://www.thimblefarms.com/cypripedium.html
- Judith Prins Tuinorchideeën in The Netherlands: https://judithprinstuinorchidee.nl/
- Phytesia in Belgium: http://www.phytesia.com/en/
- Shikoku Garden in Japan: http://www.shikoku-garden.com/English/indexenglish.htm

Of these there is one (Phytesia, Belgium) which explicitly lists the propagation of orchids for the cosmetic industry. Other nurseries growing *Dactylorhiza* and *Orchis* species and/or hybrids are found in Austria, Germany, Switzerland, the UK and the USA (https://www.orchidwire.com).

Cultivation for extraction purposes

According to the CITES Trade Database no *Dactylorhiza* species were reported to be traded as cosmetics or derivatives and the only species mentioned as traded as extracts in the CITES trade database was *Dactylorhiza fuchsii* from France to the United States. Regarding *Orchis* species France and India are the largest exporters of extracts. Indian companies offering *Orchis* have not replied to inquiries concerning the source and cultivation of the raw material. The majority of extracts for *Orchis* species (mainly *Orchis mascula*) are sourced from Belgium from the Phytesia nursery, who produced around 125,000 in vitro plants of *Orchis mascula* and the same amount of *Dactylorhiza* species (mainly *D. fuchsii*) in 2018. These are then sold on to a extract manufacturer based in France (Phytesia, pers.comm)

Analysing the source of the orchid extract used in marketed beauty products, it appears that a quantity of extract is being re-sold. For example: K-Beau, a small-scale company in the Netherlands, is offering beauty products containing *Orchis mascula* extract. They purchase their extract from Triple A Cosmetics, also in the Netherlands. This company obtains their material from Croda/Crodarom located in the US and France, whose material data sheet states that they offer 'CITES-free' material' that is obtained in accordance with international regulation and sourced from Belgium. This indicates that they use artificially propagated material, but it seems they are unaware of the CITES regulations concerning the trade in orchid derivatives. US based companies offering *Dactylorhiza* or *Orchis* extracts were also contacted but did not respond to our inquiries.

Due to confidentiality concerns of the industry, many companies offering finished products containing *Dactylorhiza* and *Orchis* extracts are unwilling to divulge the source of the extract and/or raw material for use in cosmetic products.

Commercially traded forms

The following commercially traded forms of *Anacamptis*, *Dactylorhiza* and *Orchis* species connected to the cosmetic and personal care industries were found in online databases, such as the European Commission CosIng database and the EWG's Skip Deep Cosmetics Database, and are listed by their INCI names. If the products are listed under a synonym, the currently accepted scientific name is listed in brackets. In addition, selected unfinished and finished products containing these ingredients are listed, along with their suppliers.

Anacamptis

Orchis Morio Flower Extract *(Anacamptis morio)*

Description: Orchis Morio Flower Extract is an extract of the flowers of the Orchid, *Orchis morio* L., Orchidaceae.
Functions: Soothing
CAS Number: 91770-44-4
EC Number: 294-829-7
Unfinished product: Orchid Extract (BioGründl, Barcelona, Spain).
Finished product types: Orchis Morio Flower Extract is used in Conditioner, Exfoliant/Scrub, Facial Cleanser, Foundation, Lip Balm and Moisturizer.
Selected finished products: SeneDerm Solutions Polishing Exfoliator; SeneDerm 3 in 1 Cleanser, Dry; SeneDerm 3 in 1 Cleanser, Oily to Acne; SeneDerm Solutions Facial Resurfacer; LipSense Moisturizing Lip Balm; MakeSense Original Foundations; SeneDerm DayTime Moisturizer, Oily to Acne (SeneGence International Inc., CA, USA); L'Anza Healing ColorCare Color-Preserving Conditioner (Lanza Research International Inc, CA, USA); Olay Luscious Orchid Body Lotion (Olay, Cayay, USA); Beauty Routine Skin Purify; Certified Organic Shampoo - La Recolte Des Plantes; La Recolte Des Plantes Hair Conditioner Mask (Green Energy Organics, Milano, Italy).
Suppliers: BioGründl, Barcelona, Spain; Green Energy Organics, Milano, Italy; SeneGence International Inc., CA, USA; Lanza Research International Inc, CA, USA (DAVEXLABS LLC, CA, USA); Olay, Cayay, USA (Procter & Gamble, Cincinatti, USA).

Orchis Morio Flower Water/Oil *(Anacamptis morio)*

Functions: Softening, disinfectant, anti-pruritic, calming, anti-inflammatory, and anti-redness.
Unfinished product: Orchid Water (BioGründl, Barcelona, Spain).
Supplier: BioGründl, Barcelona, Spain

Figure 1. Selection of finished products containing *Anacamptis* spp.

Dactylorhiza

Dactylorhiza Fuchsii Extract

Description: Dactylorhiza Fuchsii Extract is the extract of the whole plant, *Dactylorhiza fuchsii*, Orchidaceae.
Functions: Skin conditioning

Orchis Maculata Flower Extract (*Dactylorhiza maculata*)

Description: Orchis Maculata Flower Extract is an extract of the flowers of the Orchid, *Orchis maculata* L., Orchidaceae.
Functions: Skin conditioning
CAS Number: 90082-23-8
EC Number: 290-111-2
Unfinished products: FSS Spotted Orchid Extract G; FSS Spotted Orchid Extract BG (Formulator Sample Shop, Lincolnton, USA).
Finished product types: Anti-aging, Cleanser, Hair Conditioning. The EWG's Skip Deep Cosmetics Database only lists 'old' products for which Orchis Maculata Flower Extract was also used: Anti-aging, Blush, Eye Liner, Eye Shadow, Facial moisturizer/treatment, Styling Gel, Lotion.
Selected finished products: Aurora De Juliis MD Oxygen Revitalizing Cleanser (Aurora De Juliis MD, Monclair, USA); Dermaglow Nuvectin Instant Wrinkle Eraser (Dermaglow, Woodbridge, Canada); Ted Gibson Hair Sheet; Ted Gibson Goodnite Replenish Hair Repair Serum (Ted Gibson Cosmetics, Inc., USA).
Suppliers: Formulator Sample Shop, Lincolnton, USA; Ted Gibson Cosmetics, Inc., USA; Aurora De Juliis MD, Monclair, USA; Dermaglow, Woodbridge, Canada.

Orchis Maculata Flower/Leaf/Stem Water (*Dactylorhiza maculata*)

Description: Orchis Maculata Flower/Leaf/Stem Water is the steam distillate obtained from the flowers, leaves and stems of Orchis maculata, Orchidaceae
Functions: Masking; Perfuming
CAS Number: 90082-23-8
EC Number: 290-111-2

Figure 2. Selection of finished products containing *Dactylorhiza* spp.

Orchis

Orchis Mascula Extract

Description: Orchis Mascula Extract is an extract of the whole plant of the Salep, *Orchis mascula* L., Orchidaceae
Functions: Hair Conditioning; Skin Conditioning
CAS Number: 90082-24-9
EC Number: 290-112-8
Unfinished products: Crodarom Purple Orchid (Crodarom, Chanac, France; Croda Inc, Edison, USA)

Orchis Mascula Flower Extract

Description: Orchis Mascula Flower Extract is an extract of the flowers of the Salep, *Orchis mascula* L., Orchidaceae.
Functions: Soothing
CAS Number: 90082-24-9
EC Number: 290-112-8
Unfinished products: Orchid Extract (Carrubba Inc., Milford, USA); Orchid Extract H.GL.-M.S. (Provital Group, Barcelona, Spain); Actiphyte of Orchid (Active Organics, Lewisville, USA); Orchid Extract (Bramble Berry, Inc., Bellingham, USA).
Finished product types: Anti-aging, Body wash/cleanser, Bubble bath, Conditioner, Foundations, Hair Treatment, Lipstick, Moisturizer, Serums & Essences, Shampoo.
Selected finished products: Skinn Orchid Gel; Skinn Orchid Gel Tint; Skinn Orchid Gel Mattifying Day Treatment Seal (Skinn Cosmetics, LLC, Torrence, USA); Hello Hydration 2 in 1 Moisturizing Shampoo & Conditioner; Coconut Milk Sulfate-Free Hair Mask; White Grapefruit & Mosa Mint Shampoo; several other shampoo's and conditioners (Herbal Essences, Procter & Gamble, Cincinnati, USA). Boots No7 Matte Lip Crayon, Dusky Rose; Boots Botanics Triple Age Renewal Night Cream (The Boots Company PLC, Nothingham, England); SeneDerm Collagen Night Pak; Fooops! SenseCosmetics Dual Phase Color Remover; (SeneGence International Inc., CA, USA); Yes to Coconut Head-to-Toe Restoring Balm; Yes to Ultra Moisture Conditioner, Coconut & Argan Oil (Yes To, Inc., Pasadena, USA); Biolage by Matrix ColorLast Conditioner (Matrix, L'Oreal Group, New York, USA); Caprina by Canus Foaming Milk Bath, Orchid Oil (Canus Inc, Saint-Laurent, Canada).
Suppliers: Active Organics, Lewisville, USA; Carrubba Inc., Milford, USA; Canus Inc, Saint-Laurent, Canada; Matrix, L'Oreal Group, New York, USA; SeneGence International Inc., CA, USA; Skinn Cosmetics, LLC, Torrence, USA; The Boots Company PLC, Nothingham, England; Yes To, Inc., Pasadena, USA.

Figure 3. Selection of finished products containing *Orchis* spp.

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Commercial *Dactylorhiza* and *Orchis* trade on the Asian market

There are indications that cosmetics-related trade in *Dactylorhiza* and *Orchis* species is also taking place in several Asian countries. When searching for *Orchis mascula* in Chinese several beauty products appear in the searches. It is unclear, however, what companies offer them and where the orchids or orchid extracts are obtained. When searching in Japanese links to flowers or foreign products appear, indicating that products might be imported and not produced in-country.

Figure 4. Selection of Chinese products presumably containing *Orchis mascula*.

Orchis Mascula Extract is also offered by a number of Indian companies, such as 'Herbo Nutra' or 'Herbal Bio Solutions'. Recommended product use is: "Tonic, Special diet for geriatrics, In Ice cream Industry", indicating medicinal and nutritional use instead of use for cosmetics or personal care. Occasionally products are listed as 'extract'. It is unclear however, what type of extract this might be. It is mentioned that it comes in powdered form and that the flowers are used for the extract. However, the root is used for medicine and food, so this seems contradicting. Nevertheless, it seems unlikely that this type of extract is used in the cosmetics industry, although it is possible that these orchids, together with roots of *Dactylorhiza hatagirea* roots, which are offered as medicine, are sourced from the wild. It is unclear to what extent *Orchis mascula* is available in the wild in India, but it is known that *Orchis latifolia* (*Dactylorhiza incarnata*) does grow there and is used in a similar way.

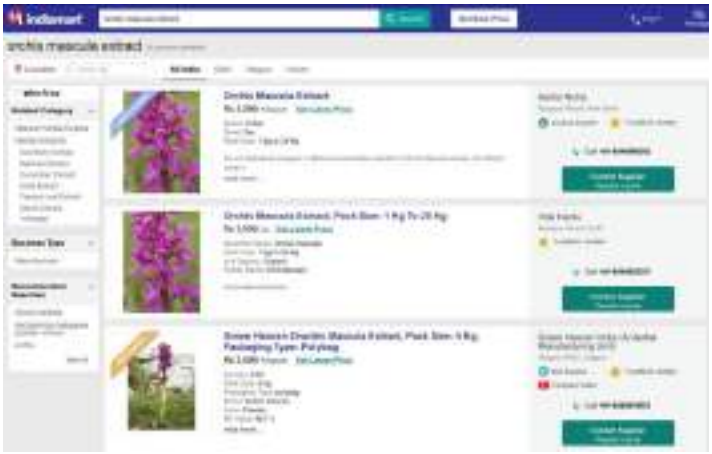

Figure 5. Selection of Orchis Mascula Extract offered by Indian companies at Indiamart.

Conclusion

Overall it proves very challenging to analyse trade routes and origins of the raw material, due to issues of confidentiality. It appears that a large quantity is sourced from a Belgian nursery artificially propagating these species in substantial quantities for use in the cosmetic and personal care industry, and it could be that the majority of European and North American companies source from this nursery. The majority of extracts sourced from these species exported by India appear to be used in the medicinal and nutritional industry. However, there is confirmed use of these species by the Indian cosmetic industry and it has proved difficult to track the trade and to confirm the source of the species used. To determine the extent of trade and the impact on wild plant populations, more insight is needed in the source material of the global companies offering crude extracts. The support of the working group in reaching out to both their national trade associations and extraction companies, particularly in India, the US and the Asian range States would be of great benefit in the understanding of this trade and the possible conservation consequences to orchid species in the wild.

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Overview of the use of Orchids in Flower and Vibrational Essences

Commissioned by
Federal Food Safety and Veterinary Office FSVO
CITES Management Authority of Switzerland and Lichtenstein
March 2017

Catherine Rutherford and Madeleine Groves

Flower and vibrational essences

Flower and /or vibrational essences are used to improve mental, emotional and spiritual well-being and are in use in kineseology, homeopathy, massage, acupuncture, reflexology, aromatherapy, counselling and others. Processing often involves the harvesting of flowers or other plant parts and placing the material in water. There are also a number of non-cutting methods used whereby the plant material and water do not come into direct contact and it is the "vibrations" from the plant that are gathered. If necessary, the water is strained to remove the plant material and the water is combined with alcohol (e.g. brandy, vodka, etc) to produce a "mother tincture" from which more dilute versions are drawn. Among other flowers, orchid hybrids are used in the production of essences. Major brands of flower essences include Bach Flower Remedies, the most popular being its Rescue Remedy.

Globally, the industry includes many small businesses and there are considered to be at least 400 different essence-making companies developing their own ranges of essences (IFER, 2014). While harvesting from artificially propagated greenhouse stock is documented by manufacturers, the level of wild harvesting is harder to determine without further research and input from the industry. It may be that only the vibrational energy from wild orchids is collected (Star Essences, 2016). Industry Codes of Conduct do not always mention sustainability issues (Confederation of Essence Practitioners, 2017).

If the plant material is submerged in water, plant chemicals may remain in it once it is filtered. Determining whether or not an essence contains an orchid species can be problematic. An orchid name is often mentioned when describing the essence, but the manufacture of the mother tincture might not have involved the harvesting or direct use of any plant. Resolution 9.6 (Rev. CoP16) recognises that "...*Article I of the Convention "defines a 'specimen' as including readily recognizable parts and derivatives of animals and plants but does not define the term 'readily recognizable', which is therefore subject to differing interpretations by the Parties*" and that "*the term 'readily recognizable part or derivative', as used in the Convention, shall be interpreted to include any specimen which appears from an accompanying document, the packaging or a mark or label, or from any other circumstances, to be a part or derivative of an animal or plant of a species included in the Appendices, unless such part or derivative is specifically exempted from the provisions of the Convention*". Following this, if the finished products do not contain any plant chemicals or DNA, then the finished products are not regulated under CITES. However, if ingredient lists contain the word "orchid" or name specific orchid species then the finished product is considered to include CITES specimens and is therefore regulated. In the past a number of CITES Parties, including the United States of America and the United Kingdom of Great Britain and Northern Ireland, have interacted with the essence industry following their enquiries as to whether essences are regulated or not (A. St John, pers. comm. to M. Groves, 2016).

Nomenclature within this industry may also prove problematic as common names are included in essence ingredient lists. For example, the use of "orchid extract" can be misleading as this may refer to a non-orchid and non-CITES listed species e.g. orchid tree *Bauhinia forticata*. Clarity from the industry is also required on whether essences fit the current CITES definition of finished products packaged and ready for retail trade or whether they go through further processing (e.g. they are combined with other essences / ingredients and are re-packagded along the supply chain).

Given the large number of essence companies in existence, the following list of finished products provides a small sample of those found in European and global trade.

Selected finished products of flower and vibrational essences in European and global trade

Australia

Product name: Dove Orchid Flower Essence
Marketer: Pure Balance, Australia Website:
http://purebalance.com.au/shop/dove-orchid-flower-essence/
Ingredients: possibly *Dendrobium crumenatum*

Product name: Donkey Orchid essence

Marketer: Living Essences of Australia, Sanori House, Suite 102/126 Grand Blvd Joondalup, western Australia, Australia 6027. Postal Address Living Essences PO Box 3012 Joondalup WA 6027, Australia Tel: +00 61 (0)8 9301 1234 Fax: +00 61 (0)8 9301 1265 Email: orders@livingessences.com.au Website: https://tinyurl.com/zg2nkqe

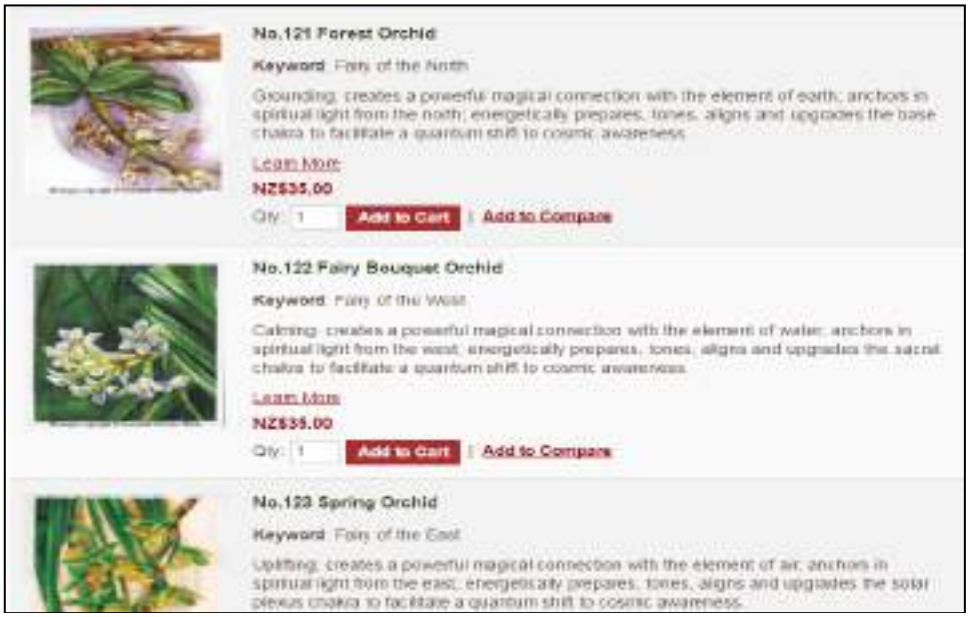
Ingredients: possibly species of the genus *Diuris*

Product name: Australian Bush Flower Essences Red Helmet Orchid

Marketer: Australian Bush Flower Essences - Bush Biotherapies Pty Ltd, trading as Australian Bush Flower Essences, 45 Booralie Road, Terrey Hills NSW 2084, Australia Tel:+ 61 2 9450 1388 Fax: 61 2 9450 2866 Email: info@australian-bushflowers.com Website: http://ausflowers.com.au/

Ingredients: possibly *Corybas downlingii*

New Zealand



Product name:

Marketer: First Light Flower Essences of New Zealand, P.O.Box 60 275, Titirangi, 0642, Auckland, New Zealand Tel: (+64) 9 817-6737 Email: info@firstlightfloweressences.co.nz Website: https://tinyurl.com/zr587uo

Ingredients: website states "The Orchid Essence Collection is a specialist range of essences made from eight New Zealand native orchids".

UK

Product name: Angel Orchid and Gem Essences - Courage

Marketer: Gaia Essences, 28 Glebelands Road, Tiverton, Devon EX16 4EB, UK. Telephone: 01884 259130 Email: cathie@rainbowtherapy.fsnet.co.uk Website: https://tinyurl.com/jy9s4l5

Ingredients: possibly species of *Disa*, *Cattleya* and white *Phalaenopsis* orchids

Product name: sells a variety of essences made by other companies

Marketer: G.Baldwin and Co., 171/173 Walworth Road, London, SE17 1RW, England Tel: +44 (0)20 7703 5550 Website: https://tinyurl.com/jfpzzg8
Ingredients: depends on the product but may include species of the genus *Caladenia* (spider orchids)

Produc name: Angelic Canopy essence and Andean Fire essence
Markerter: Healing Orchids, Achamore House, Isle of Gigha, Argyll, Scotland PA41 7AD, UK. Tel: +01 583595385 Website: http://www.healingorchids.com/ and http://www.healingorchids.com/livingtreeorchids.html
Ingredients: possibly *Phragmipedium* spp. or hybrids, *Laeliocattleya* hybrids

USA

Product name: Grounding Green essence

Marketer: Flower Essence Services (FES), PO BOX 1769, Nevada City, California 95959, USA. Tel: (orders): + (800) 548-0075 Fax: +(530) 265-6467 Website: http://www.fesflowers.com/our-company/
Ingredients: possibly *Habenaria clavellata* (synonym for *Platanthera clavellata*)

Product name: Wise Action, Wonderous Heart and Purpose Flower essences
Marketer: Orchid Essences (makes Dancing Light Orchid Essences), Alaska, USA Tel: + 1-907-687-3268 Email: ssk@orchidessences.com Website: http://www.orchidessences.com/order_dancing_light_orchid_essences.html and Dancing LIght Orchid Essences http://www.powerfloweressences.com/orchid-flower-essence
Ingredients: possibly *Cattleya*, *Vanda* and *Phragmipedium* species

Information and Societies

- The British Flower and Vibrational Essence Association's Guide to Flower and Vibrational Essences http://bfvea.com/resources/BFVEA_guide_to_FE__VIB_Essencesnov13.pdf
- The Journal of Vibrational / Flower Essences. Publication of The World Wide Essence Society, PO Box 285, Concord, MA, USA https://tinyurl.com/j6j7rjm
- Flower Essence Society, P.O. Box 459, Nevada City, CA 95959, USA Tel:800-736-9222 (US & Canada) / 530-265-9163 Fax: 530-265-0584 E-mail: mail@flowersociety.org
- International distributors of essences – see FES Flowers, USA. Website: http://www.fesflowers.com/customer/international-distributors

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Overview of orchids in the Fragrance Industry

Many fragrances citing orchids in their title or in publicity material are probably reconstructions of the orchid fragrance and do not contain any orchid species (R. Clery, pers. comm. to M. Groves, 2016; E. Covey, pers. comm. to M. Groves, 2017). This may include fragrances such as the 1988 "Singapore Bliss" (signature scent of Singapore Airlines) which cites *Vanda* Miss Joaquim as an ingredient. The only fragrance identified that directly states it uses *Vanda* species is called "Miss Udorn Sunshine",first formulated in 1976. This fragrance is produced in Thailand from a hybrid that includes *Vanda* Josephine Van Brero (*Vanda* teres x *Vanda insigne*) and *Vanda denisoniana* and is also for sale on the Internet (Amazon, 2017; Lanta Orchid Nursery, 2017; D. Sripotar, pers.comm. to M. Groves, 2017). Given some companies offer to formulate bespoke fragrances, any suitable orchid species may enter trade.

If orchids were in trade as a fragrance ingredient they would likely be in the form of an extract, in particular as an essential oil. If orchids are part of a fragrance, the nomenclature on the packaging is 'perfume' or 'fragrance' due to Intellectual Property protection concerns, but individual fragrance ingredients do not need to be listed, unless they are included in a list of 26 allergens (Regulation (EC) No 1223/2009). The description of natural ingredients (Natural Complex Substances or NCS) is often complex as many qualities have significantly different compositions. A botanical extract can have various origins, be obtained via different processes and come from different plant parts. These challenges have the potential to cause inadequate data assignment or misinterpretation and can lead to inadequate safety assessments. Previously, in order to link an entry to a plant species the Chemical Abstracts Service (CAS) number would have to be known and not all species have such numbers assigned to them.

Therefore, an appropriate nomenclature has been developed, based on the ISO Norm 9235, and integrated into the Research Institute for Fragrance Materials (RIFM) database to unambiguously describe natural ingredients used in the fragrance industry by members of the International Fragrance Association (IFRA). The nomenclature will consist of a number indicating the type of extract and a letter representing the botanical parts used for the preparation of the NCS. The implementation of this new nomenclature is due for completion shortly. The 2015 IFRA Volume of Use survey will take this major change into account. The RIFM Database is only accessible to members. A list of ingredients (with the botanical name) used in the fragrance industry (so called transparency list) is found on IFRA's freely accessible website (2017) but will not necessarily provide the full level of detail (plant part, process)(M. Vey, pers. comm. to M. Groves, 2017).

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http://www.lanta-orchidnursery.com/perfume_eng.htm

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Overview of the use of orchids in the cosmetic and personal care industries

Commissioned by Federal Food Safety and Veterinary Office FSVO

CITES Management Authority of Switzerland and Lichtenstein

2017

Madeleine Groves and Catherine Rutherford

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Background

This report is a follow up to documents PC22 Doc. 22.1 and Doc 22.1 Annex 1 (*Quick Scan of Orchidaceae species in European commerce as components of cosmetic, food and medicinal products,* Brinckmann, 2014) presented at the 22nd meeting of the CITES Plants Committee (PC22, Tblisi, Georgia, Sept 2015).

Both the documents and the Plant Committee's working group on annotations for Appendix-II listed orchids identified that a number of orchids are included as ingredients in finished cosmetic and personal care products. This report summarises information on the supply chain from raw material to finished product, gathered through extensive outreach and cooperation by parts of the cosmetic and personal care product industry and a number of trade associations. The use of *Vanilla* species has not been covered in this report as the majority of raw material and finished products identified in trade fall under the exempted products outlined in point d) of #4 annotation against the Appendix II listing for Orchidaceae spp.

Legislation and industry standards

Legislation – there are a number of different country- or region-wide regulations and laws applicable to this industry. The following are examples of these:

PR China - cosmetics and cosmetic ingredients are regulated by a number of laws including Regulations concerning the hygiene supervision over cosmetics (1990); Detailed Rules for the Implementation of the Regulation on the Hygiene Supervision over Cosmetics (2005); Standard Chinese Names of International Cosmetics Ingredients Inventory (2010); Cosmetics Technical Requirement Standard (2011); Guidelines for the Registration and Evaluation of New Cosmetic Ingredient (2011); AQSIQ Order No. 143 of 2011 - The Administrative Measures on the Inspection, Quarantine and Supervision of Chinese Imported & Exported Cosmetics (2011).

- **USA** – There are numerous laws pertaining to cosmetics imported into and marketed in the US, including the Federal Food, Drug, and Cosmetic Act (FD&C Act) and the Fair Packaging and Labeling Act (FPLA). The US Food and Drug Administration (FDA) regulates cosmetics under these laws.
- **EU** - Regulation (EC) No 1223/2009 (the "Cosmetic Products Regulation"), as amended, harmonizes and simplifies the cosmetics regulations across the EU member states, including ingredient labelling requirements.

Definitions – each country or region may have differing definitions of a cosmetic:

- **EU** – The EU Regulation (EC) No 1223/2009 defines a cosmetic product to mean *"any substance or mixture intended to be placed in contact with the various external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming*

them, changing their appearance and / or correcting body odours and / or protecting them or keeping them in good condition".

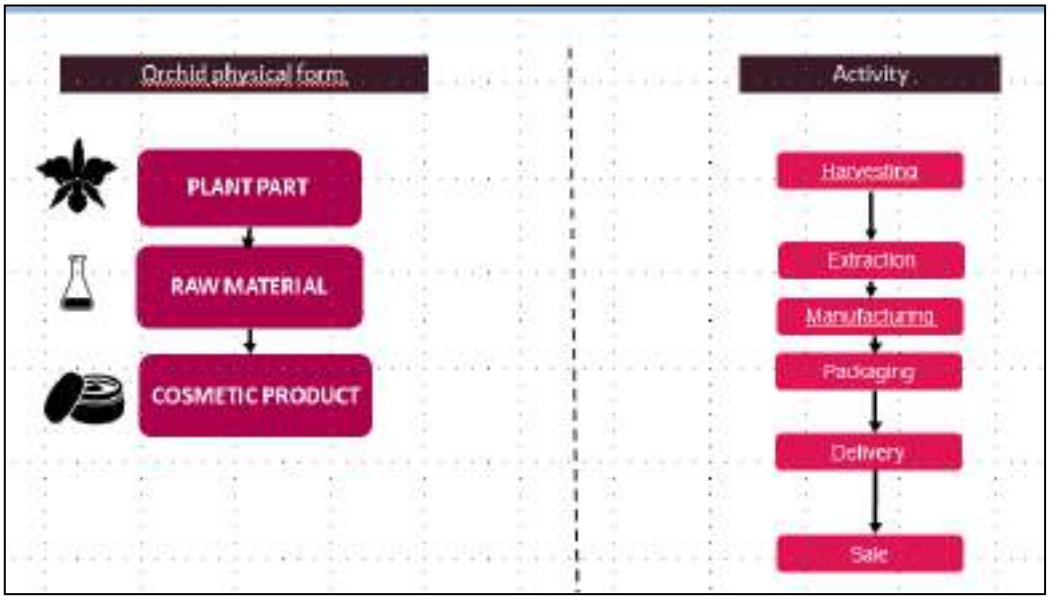
- **USA** - The FD&C Act defines a cosmetic as "*Articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body...for cleansing, beautifying, promoting attractiveness, or altering the appearance*."

Industry standards and certification bodies – stakeholders implement or follow a number of different industry standards and in-market controls. They include Good Manufacturing Practices (GMP), and the use of certification bodies including ECOCERT (first certification body to develop standards for "natural and organic cosmetics") and The Soil Association (for organic products).

Cosmetic and personal care product industry supply chain and stakeholders

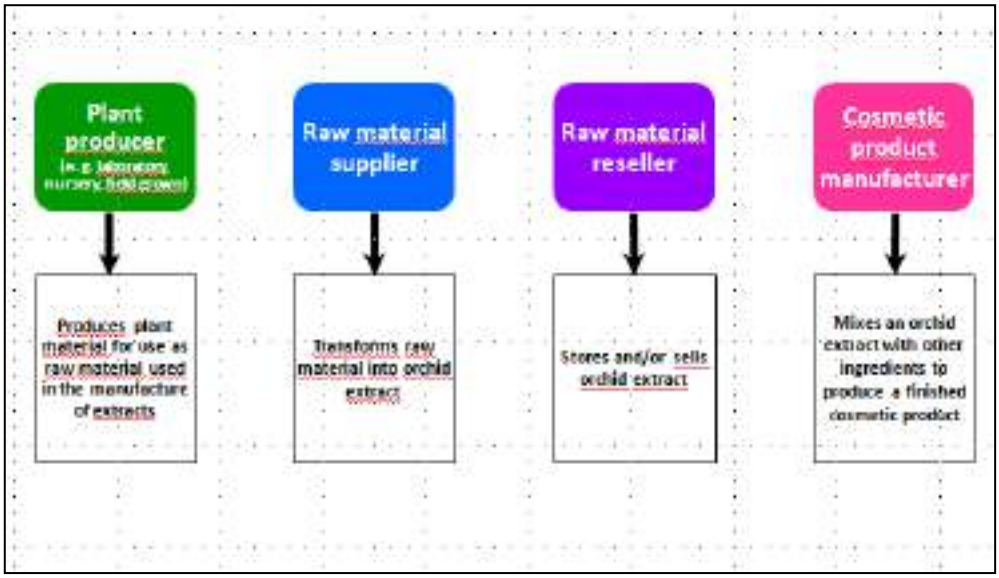
Figure 1 provides an overview of the supply chain in place for this industry.

Fig. 1 – Supply chain for plant to finished cosmetic product



The main stakeholders identified in this industry are summarised in Fig. 2. However, it must be noted that the general names used for these stakeholders can differ slightly within the industry (e.g. "plant producers" were also found called "manufacturers").

Fig. 2 – Main cosmetic industry stakeholders



Raw material – source and supply

Species used - work with the industry and its trade associations is underway to compile a full list of orchids utilised by this industry. Table 1 lists a number of the main species and hybrids identified in trade to date. See Annex I (PCPC orchid extract list).

Parts of orchids grown and harvested - Table 1 summarises the parts produced and harvested to supply raw material with which to make orchid extracts. From this information, analysis of CITES trade data and research carried out for the case studies it appears that all material traded to supply the production of orchid extracts is supplied from artificially propagated sources.

Table 1 – Examples of source and type of orchid parts used to produce raw material

Species	Species or hybrid	Country of production	Propagation type	Propagation source	Stakeholder	Parts harvested or produced
Brassocattleya Marcella Koss	Hybrid	Japan	Artificially propagated	Greenhouse	Raw material supplier	Leaf, Stem
Cycnoches cooperi	Species	France	Artificially propagated	Greenhouse and tissue culture	Raw material supplier	Flower, Leaf, Root, Stem
Cymbidium grandiflorum	No details	No details	No details	Farmed	No details	Flower
Dendrobium chrysotoxum	Species	PR China	Artificially propagated	Jungle farming	Local people	Flower
Dendrobium nobile	Species	Germany	Artificially propagated	Laboratory	Raw material supplier	Protocorm
Gastrodia elata	Species	Rep. of Korea	Artificially propagated	Farming	Raw material supplier	Root
Orchis mascula	Species	Belgium	Artificially propagated	Greenhouse / Farmed	Raw material supplier	Leaf, Root, Stem, whole plant
Papilionanthe teres	Species	Thailand	Artificially propagated	Nursery	Raw material supplier	Stem
Phalaenopsis	Hybrid	Netherlands	Artificially	Greenhouse	Raw material	Leaf, Root, Stem

'Anubis'			propagated	(in Switzerland)	supplier	
Phalaenopsis amabilis	Species	France	Artificially propagated	Greenhouse	Raw material supplier	Leaf, Root, Stem
Vanda coerulea	Species	PR China	Artificially propagated	Jungle farming	Local people	Stem
Vanda coerulea	Hybrid	Thailand	Artificially propagated	Nursery	Raw material supplier	Stem
Vanda coerulea	Species	France	Artificially propagated	Nursery and tissue culture	Raw material supplier	Aerial parts / flowering tops

Table 1 shows that a number of the terms used to describe the source of the raw material (e.g. "farmed" and "jungle farming") are not generally used within CITES when describing plant production. Therefore, further outreach to industry is required to investigate whether these terms fit within the current CITES definition of artificial propagation (Resolution Conf. 11.11 (Rev. CoP17) or whether the industry and CITES Parties can agree clear, standardised, mutually understandable terms that fit both relevant reporting requirements and definitions. This report also identified that clarification with the industry is required to ensure the exemption under point b) of the #4 annotation against Appendix II Orchidaceae spp. listing is correctly implemented i.e. that tissue cultured plants are shipped both in sterile containers and in solid or liquid media.

Table 1, analysis of CITES trade data and research carried out for the case studies show that the plant material is sourced from a number of producer countries in both range and non-range States. Tahiti was also identified as a producer country. An example of the general flow of material along the supply chain for a number of species and the types of documents required is shown in Figs. 3-6.

Fig. 3 – Flow of material from EU plant producer to EU finished product manufacturer (*Cycnoches cooperi*)

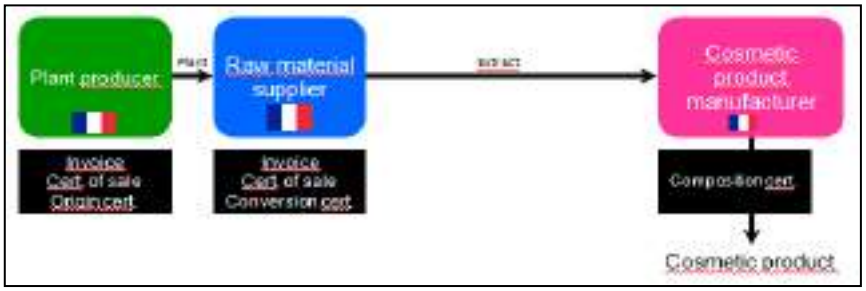


Fig. 4 – Flow of material from external plant producers into the EU (*Papilionanthe teres*)

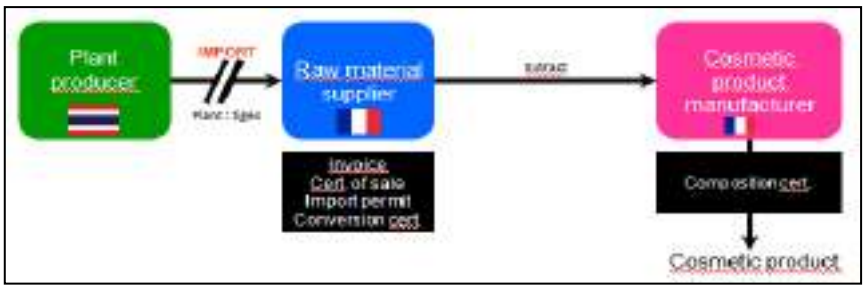


Fig. 5 – Flow of material from external plant producers into the EU (*Vanda coerulea*)

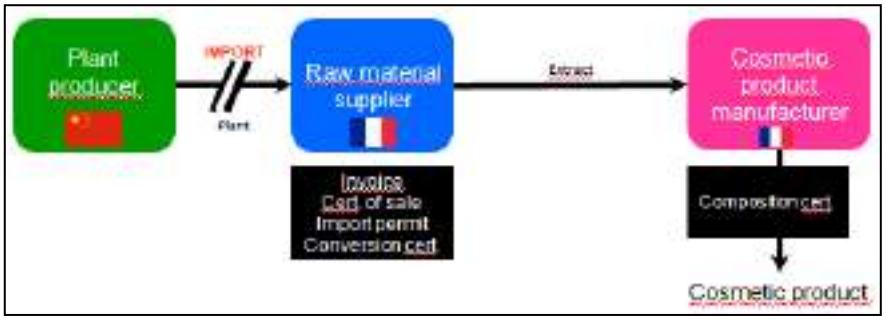
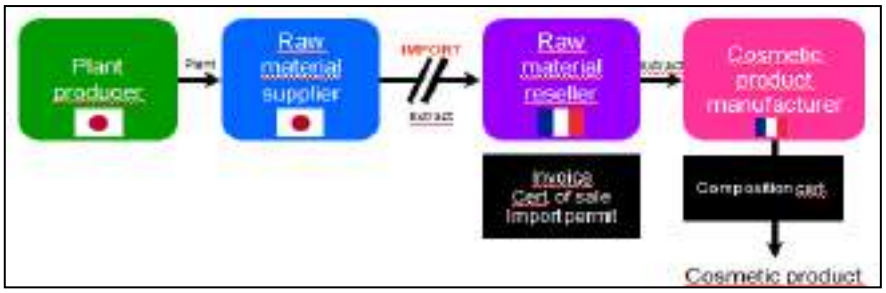


Fig. 6 – Flow of material from external plant producers and extract suppliers into the EU (*Brassocattleya* Marcella Koss)



Extraction

Table 2 shows the different types of extraction processes that are used to produce orchid extracts and the quantity of plant material required to produce 1 kg of extract. Further outreach to orchid experts and the industry is required to translate this formula into the number of plants required to make one gram of plant material.

Table 2 - different types of extraction

Species	Processing country	Supplier type	Extraction type	Physical form	Post transformation	INCI NAME	How many grams of plant material = 1 kg of extract
Brassocattleya Marcella Koss	Japan	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT/ BRASSOCATTLEYA MARCELLA KOSS LEAF / STEM EXTRACT	No data
Cycnoches cooperi	France	Small-scale extraction firm	Maceration	Liquid	No other process	ORCHID EXTRACT / CYCNOCHES COOPERI (ORCHID) FLOWER/LEAF EXTRACT	9.8g of *Cycnoches cooperi* = 1kg of extract
Dendrobium chrysotoxum	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT	70g of *Dendrobium chrysotoxum* = 1kg of extract
Dendrobium nobile	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT / DENDROBIUM NOBILE EXTRACT	100g of *Dendrobium nobile* = 1kg of extract
Gastrodia elata	Rep. of Korea	Small-scale extraction firm	Ethanol	Liquid	No other process	ORCHID EXTRACT / GASTRODIA ELATA ROOT EXTRACT	No data
Orchis mascula	France	Small-scale extraction firm	Microwave extraction in water and	Liquid	No other process	ORCHID EXTRACT / ORCHIS MASCULA EXTRACT	No data

			glycerin				
Papilionanthe teres	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT	81 g of *Papilionanthe teres* = 1kg of extract
Phalaenopsis 'Anubis'	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT	39g of Phalaenopsis 'Anubis' = 1kg of extract
Phalaenopsis amabilis	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT / PHALAENOPSIS AMABILIS EXTRACT	85g of *Phalaenopsis amabilis* = 1kg of extract
Vanda coerulea	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT	111g of *Vanda coerulea* = 1kg of extract
Vanda coerulea	France	Small-scale extraction firm	Butylene glycol	Liquid	No other process	ORCHID EXTRACT	111g of *Vanda coerulea* =1kg of extract

Finished cosmetic products

Orchid extracts in finished products - Industry feedback confirms that finished products may contain any of the following: a single orchid extract produced under a certain batch number; two samples of the same orchid extract from different batch numbers; a number of different orchid extracts; a combination of different orchid extracts, all from different batch numbers. This demonstrates the difficulties in traceability of the raw materials used in the manufacturer of finished cosmetic products. This becomes even more complicated when individual products are combined into retail or travel sets with different extracts from different batch numbers

Global trade - The international trade in orchids as finished cosmetic products raises a number of issue that require further discussion between the CITES community and the cosmetic and personal care industry to ensure there is full and correct implementation and understanding of CITES requirements:

- **Personal and household effects (Resolution Conf. 13.7 (Rev. CoP17)** – it is important to clarify whether the cosmetic industry and retailers fully understand when this is applicable so that they can relay this information to their customers. For example, when travelling to and from the EU this exemption may not be the same for EU residents versus non-EU residents.
- **CITES certificates and permits** – research undertaken for this report and analysis of CITES trade data show that it is unlikely the full trade in finished products containing orchids is documented or legal under CITES. Ignorance of the use of orchids in this industry, lack of knowledge or poor implementation of the #4 annotation for the Appendix II listing of orchids and the reporting burden on both CITES Parties and industry given the large number of products containing orchids in trade have all contributed to the current situation. In particular, further industry clarification is required over the use of point b) of #4 annotation in that tissue cultured plants must be "....*in solid or liquid media, transported in sterile containers*".

- **Definition of artificial propagation –** a number of companies use the terms "farmed" or "jungle farmed"; these processes may not fully meet the definition of artificial propagation.

Nomenclature – to track the use and trade in orchid extracts and finished products it is important to be able to link a scientific name to a cosmetic ingredient / product. All cosmetic and personal care products must list the ingredients used. One way to track the use of orchid extracts can be done by checking the International Nomenclature Cosmetic Ingredient (INCI) names cited in these lists. This is a single ingredient name coined by the International Nomenclature Committee (INC) to describe a cosmetic ingredient, such as orchid extracts (e.g. Cycnoches Cooperi Flower / Leaf Extract). They are published in the International Cosmetic Ingredient Dictionary and Handbook overseen by the Personal Care Products Council (PCPC), USA. Some ingredient lists only record "Orchid Extract" which can denote an ingredient /product that does not have an INCI name. Industry feedback confirms that this term may also be used for confidentiality reasons; a desire to keep ingredient lists simple for the customer; the necessity to have a name that complies with different international legislation; to ensure ingredient listings fit on one side of the packaging; and to ensure packaging and ingredient lists remain current despite changes to botanical names (e.g. *Vanda teres* = *Papilionanthe teres*). If there is no INCI name for a particular ingredient then it is possible to apply for one from the INC. In the absence of an INCI name, companies can use an alternative as listed below:

- the International Cosmetic Ingredient Dictionary and Handbook published by the Personal Care Product Council (PCPC);
- chemical name;
- European Pharmacopoeia name;
- international non-proprietary name as recommended by the World Health Organisation; or
- European Inventory of Existing Commercial Chemical Substances (EINECS), International Union of Pure and Applied Chemistry (IUPAC) or Chemical Abstract Service (CAS) identification reference.

The cosmetic industry and regulatory bodies recognise that industry / regulation inventories should be updated to include more information on botanical entries instead of English names, including information on the plant parts used.

Readily Recognisable – Resolution Conf. 9.6 (Rev. CoP16) defines a 'specimen' as including "*readily recognizable parts and derivatives of animals and plants but does not define the term 'readily recognizable', which is therefore subject to differing interpretations by the Parties*". It goes on to state that the Conference of the Parties to the Convention "*AGREES that the term 'readily recognizable part or derivative', as used in the Convention, shall be interpreted to include any specimen which appears from an accompanying document, the packaging or a mark or label, or from any other circumstances, to be a part or derivative of an animal or plant of a species included in the Appendices, unless such part or derivative is specifically exempted from the provisions of the Convention".*

Derivatives – reporting finished products under this term shows that the product has been processed in some form (CITES definition is either "derivative" or 'Any processed part of an animal or plant (e.g. medicine, perfume, watch strap)'. However, if a situation arises whereby finished products are exempted from CITES regulation there is some merit in ensuring Parties are in agreement as to whether this only applies to finished products requiring no further processing or re-packaging.

Industry references, databases and research

- **CosIng** (cosmetic ingredient database) – CosIng is the European Commission database for information on cosmetic substances and ingredients contained in the Cosmetics Regulation Regulation (EC) No 1223/2009 of the European Parliament and of the Council, the Cosmetics Directive 76/768/EEC (Cosmetics Directive), as amended, the Inventory of Cosmetic Ingredients as amended by Decision 2006/257/EC establishing a common nomenclature of ingredients employed for labelling cosmetic products throughout the EU and opinions on cosmetic ingredients of the Scientific Committee for Consumer Safety (List of SCCS opinions). CAS, ELINCS or EINECS numbers can be searched for in CosIng.
- **La Fédération des Entreprises de la Beauté (FEBEA) –** FEBEA is a trade association representing professionals and manufacturing companies in the cosmetics sector (perfume, care, make-up, hygiene or toiletries, hair products) in France.
- **Personal Care Product Council (PCPC) -** the leading national trade association representing the global cosmetic and personal care products industry, based in Washington, D.C., USA. It represents more than 600 member companies who manufacture, distribute, and supply the majority of finished personal care products marketed in the U.S. It operates and coordinates several databases and publications, including the *International Buyer's Guide* (see Fig. 7), which provides details of ingredient suppliers, and the *International Cosmetic Ingredient Dictionary (ICID)*, which lists INCI names, internationally recognized names to identify cosmetic ingredients.

Fig. 7 – screenshot of PCPC's International Buyer's Guide for *Vanda coerulea*

- **Fragrance Databases** – see Overview of Orchids in Fragrances
- **Patents** – see Annex II: Articles, Posters, Patents