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RESEARCH LETTER

Determining the legality of newly described CITES-listed species in the horticulture trade of tropical pitcher plants (*Nepenthes*)

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Article impact statement: Ability to conduct due diligence exercises in the wildlife trade requires access to information, but this access appears to be variable.

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Abstract

Due diligence is a fundamental component of ensuring a sustainable and legal wildlife trade that is also supportive of the livelihoods and businesses that depend on the trade. This is particularly true with species listed on the Convention on International Trade in Endangered Species (CITES) that are considered threatened or may become threatened by trade. Undertaking due diligence exercises requires access to information on which to base such decisions; however, the extent to which information is available is unclear. We used the trade in tropical pitcher plants (*Nepenthes*) for horticultural purposes as a case study to determine the extent to which information is available. A systematic survey of online trade was conducted for species described from 1996 to 2016. For the species found in trade, these were cross-referenced with the CITES trade database, and inquiries were made to the relevant CITES Management Authorities and National Focal Points Access and Benefit Sharing (ABS). Of 83 newly described species, 61% were offered for sale online in 2018. Despite all *Nepenthes* species being listed on CITES, only 23% ($n = 19$) of the species being sold online were reported in trade on the CITES Trade Database, and only 3 were from the countries of origin. Thirty-two of these species had no international trade recorded according to the database. Management authorities of CITES for the countries of origin confirmed trade had been permitted for 5 of 32 species. Lack of CITES records may be explained by trade under “*Nepenthes* spp.” or as exempt parts and derivatives. However, permits to collect and commercialize are likely to be required as part of the Nagoya Protocol on ABS from the Convention on Biological Diversity. The ABS National Focal Points were contacted to determine whether collection or commercialization permits had been issued for the remaining species. Only 2 of 7 focal points replied, and both stated no permits had been issued. Lack of traceability information or response related to the issuance of collection and commercialization permits is concerning and hinders the due diligence of businesses and consumers wanting to ensure their trade is legal, sustainable, and ethical.

KEYWORDS

Access and Benefit Sharing, CBD, due diligence, legal acquisition, Nagoya Protocol, wildlife trade

INTRODUCTION

Legal and illegal trades in wildlife do not operate as separate entities; rather, they overlap, with the legal trade at times acting as a mechanism through which illegally acquired wildlife is laundered (Tensen, 2016). This is particularly acute in exotic pet and plant trading and when new species are being discov-

ered and there is a desire from consumers to acquire these. As a result, government officials, traders, and consumers face the challenge of determining the legality of species in trade based on the available data.

The horticultural trade is an important, but often overlooked, wildlife trade (Margulies et al., 2019) because it is sizable in terms of financial value and the number of species and

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individuals traded (Gale et al., 2019; Wong & Lui, 2019). Current demand in the horticultural trade for new species has resulted in some populations and entire species being driven to extinction. For example, *Paphiopedilum vietnamense*, from Vietnam, was first described in 1999, only to be listed as extinct in the wild in 2003 (Averyanov et al., 2003). Likewise, the tropical pitcher plant, *Nepenthes rigidifolia*, from Indonesia, was described in 2004 but is now listed as critically endangered with fewer than 10 individuals left (Clarke, 2014; McPherson, 2009). This level of overexploitation and the speed at which material of newly described species is entering the wildlife trade have raised concerns as to whether the material in trade has been legally acquired. Further, ethical concerns exist as to whether local communities are receiving benefits, economic or otherwise, from access to these new species.

For international trade in CITES (Convention on International Trade in Endangered Species)-listed species, the issuance of a CITES permit by a CITES management authority requires a nondetriment finding (NDF) and a legal acquisition finding (LAF) (cites.org). The latter requirement highlights that illegality in the wildlife trade refers not only to breaches under CITES but also to all forms of illegality at the domestic and international levels. These can relate to a number of aspects of trade, such as animal and plant health, animal welfare related to holding and transport, and regulations related to harvesting and the Nagoya Protocol on Access and Benefit Sharing (ABS) of the Convention on Biological Diversity (CBD) (CBD, 2016).

Beyond the LAF undertaken by a CITES management authority, there is an expectation that businesses trading in wildlife and those purchasing wildlife will take reasonable measures to determine the legality of an item they are planning to acquire (i.e., due diligence). Taking such measures to determine legality is important because illegal trade does not just threaten the species being traded, it also undermines the systems on which a trade depends. This, however, requires that such stakeholders have access to information to allow them to make informed decisions.

For CITES-listed species, the CITES Trade Database (CITES Secretariat & UNEP-WCMC, 2022) provides a useful starting point to determine whether the country of origin has ever issued an export permit for a given species. In addition, all CITES management authorities provide a contact point listed on the CITES website (cites.org/eng/parties/country-profiles/national-authorities) to which queries, such as regarding the legality of a species, can be sent. Beyond determining whether a CITES permit has ever been issued, there are other legislative frameworks that may require investigation. This is particularly important because for some CITES-listed species, exemptions exist, such as for the seeds of some species, through which species may enter trade without a permit and therefore would not be recorded on the CITES Trade Database or be known to a CITES management authority. The Nagoya Protocol on ABS of the CBD provides a framework through which material may be collected and commercialized. Unfortunately, a centralized database, equivalent to the CITES Trade Database, does not exist through which an individual can determine if collection

and commercialization permits have been issued for a specific species (but see the ABS Clearing-House [absch.cbd.int/en/]). However, like CITES, contact details for ABS National Focal Points (cbd.int/information/nfp.shtml) are provided through the CBD website including for countries that have yet to ratify the Nagoya Protocol (absch.cbd.int/en/).

Using the horticulturally desirable carnivorous plant genus, *Nepenthes*, as a model genus, we investigated the extent of trade in newly described species, the extent to which legal acquisition can be shown, and the ease with which stakeholders can determine this as part of a due diligence exercise.

METHODS

Ethics approval for this study was received from the Research and Ethics Committee, School of Anthropology and Conservation, University of Kent.

Case study genus

The genus *Nepenthes* comprises approximately 170 species of carnivorous pitcher plants (Christenhusz & Byng, 2016), found predominantly in Southeast Asia, although they range from Madagascar to Australia and Vanuatu (McPherson, 2009). Although some species are used in medicines (e.g., ayurvedic medicine), species are highly sought after for the horticultural trade. As a result, all but 2 species of *Nepenthes* are listed on Appendix II of CITES (cites.org/eng/app/appendices.php). At the time of this study in 2018, the standard nomenclature adopted by CITES referring to *Nepenthes* was von Arx et al. (2001). There are, however, important exemptions for species listed on Appendix II outlined under Annotation 4, pertinent to *Nepenthes*: seeds and pollen (4a) and in vitro material (4b) (Schipman, 2016).

Species list

A list of all *Nepenthes* species described from 1996 to 2018 was compiled using the *Nepenthes* species list from Wikipedia. We cross-checked the list and supplemented it with data extracted from the International Plant Names Index (ipni.org). The species list was then cross-checked with the Integrated Taxonomic Information System (itis.gov), the International Union for Conservation of Nature (IUCN) Red List (iucnredlist.org), and the CITES Carnivorous Plants Checklist (von Arx et al., 2001) to identify accepted names and synonyms. Following consultations with experts familiar with *Nepenthes* taxonomy, 10 species considered synonymous were removed. Distribution data, including whether species were confined to protected areas due to the likely extra permissions required to collect in such locations, were added to the species list. Distribution was determined through a literature search that included the IUCN Red List of Threatened Species (iucnredlist.org) and a series of bibliographic references (Appendix S1).

Systematic web search

From 22 February to 9 April 2018, a systematic web search following Roberts et al. (2022) was conducted on Google. We used the search term “*nepenthes sale* OR £ OR \$ OR *price*,” which we had tested and refined prior to use. After the removal of duplicates, 100 links were recorded. These links were then searched for *Nepenthes* species for sale, either via the search function with the search term “*Nepenthes*” or with the navigation menus. Some links led to third-party lists of nurseries or sellers. Sellers on these lists that were not present in our initial Google search were added to the list for screening. Links to universal sellers (e.g., Aliexpress, Amazon, eBay) were followed, and a search was performed in the search function for the term “*Nepenthes*.” Facebook came up in the initial search; however, due to the nature of the site requiring a personal login to perform searches, a site search via Google was conducted using our standard search term: “[site:www.facebook.com](https://www.facebook.com) *nepenthes sale* OR £ OR \$ OR *price*.” The Facebook search revealed 65 pages after duplicates were removed, many of which linked to online shops we had already searched. Within Facebook pages, public posts were searched until the beginning of the year for sales posts that did not duplicate entries from the associated websites.

CITES trade data

The CITES Trade Database reflects official trade records as reported by parties in their annual reports to CITES, as such it is the most comprehensive data source on traded species. The trade database guide (CITES Secretariat & UNEP-WCMC, 2022) recommends that “Parties base their annual reports on permits or certificates that have been used (‘actual trade’), rather than those that have been issued (‘permits issued’).” Although it cannot be ruled out that some countries may report on permits issued, the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) carries out a number of validation checks on the data before uploading it to the database (CITES Secretariat & UNEP-WCMC, 2022). Nonetheless, the data reported may represent an upper limit of the true volumes in trade.

Trade data were downloaded from the CITES Trade Database for all *Nepenthes* in trade from 1996 to 2016. We chose 1996 as our start date because, from this point, a number of validation checks were carried out before uploading to the database. We used 2016 as the end date because our study was conducted in 2018, and the database guide (CITES Secretariat & UNEP-WCMC, 2022) states that “the most recent year for which comprehensive trade statistics are available is normally 2 years before the current year.”

The CITES trade data were used to cross-check species in online trade according to the web search with those recorded in the CITES trade database. Direct trade was analyzed by selecting the “origin blank” option so as to avoid double counting reexported specimens, following Robinson and Sinovas (2018). Only exporter figures are reported because all but 2 species

of *Nepenthes* are listed on Appendix II; therefore, only export permits would have been required in the vast majority of cases.

Country contact points

The CITES and ABS contact points in all origin countries for which online trade was recorded, but no CITES trade had been recorded, were contacted via email. Contact points were asked whether export permits had ever been issued for the *Nepenthes* species recorded in online trade. One follow-up reminder email was sent 3 weeks later if a reply had not been received (Appendix S2).

RESULTS

According to the CITES Trade Database, 11,639,068 (exporter reported) live *Nepenthes* specimens entered trade from 1996 to 2016, representing a median of 338,304 specimens per year. Trade increased over this time and peaked in 2014 and 2015 according to exporter-reported figures (Figure 1). A total of 102 species (reported as “*Nepenthes* spp.” and “*Nepenthes* hybrid”) were traded over this period. The majority (99.9% of exporter-reported specimens) were traded under the term *live Nepenthes*. *Nepenthes* was also traded, to a much lesser extent, as cultures, specimens, dried plants, leaves, seeds, powder, flowers, stems, derivatives, extract, and roots. The majority (99.9% of exporter reported) of live specimens were traded as artificially propagated, and 12,263 (0.1% of exporter-reported) were traded as wild. The 3 most significant export countries were China, Sri Lanka, and Belgium.

We identified 83 extant *Nepenthes* species described since 1996 (Appendix S3). Of these, only 13 (20%) were listed on the CITES Carnivorous Plants Checklist (von Arx et al., 2001) (Appendix S3). Trade as reported in the CITES Trade Database was recorded for 19 (23%) of the species described since 1996 for a total of 148,084 (exporter reported) live specimens traded from 1996 to 2016. However, for the 19 species that were also recorded in the CITES Trade Database, only 3 had CITES trade recorded from their country of origin (*Nepenthes macrophylla*, *Nepenthes mindanaoensis*, and *Nepenthes murudensis*). For the remaining 16 species that were not recorded in CITES trade from their origin countries, 8 were endemic to Indonesia (*Nepenthes angasanensis*, *Nepenthes aristolochioides*, *Nepenthes danseri*, *Nepenthes diatas*, *Nepenthes flava*, *Nepenthes jacquelineae*, *Nepenthes jamban*, and *Nepenthes lavicola*), 2 to the Philippines (*Nepenthes mira* and *Nepenthes sibuyanensis*), one to Malaysia (*Nepenthes benstonei*), and one to Thailand (*Nepenthes thai*).

In total, 61% ($n = 51$, including in-stock and out-of-stock listings) of species described since 1996 were found in online trade listings; 44 of these were in stock or available to pre-order at the time the online search was carried out (Appendix S3). Of all 51 species found in online trade, 32 (63%) had no trade recorded according to the CITES Trade Database (Appendix S3). However, none of these 32 species were recog-

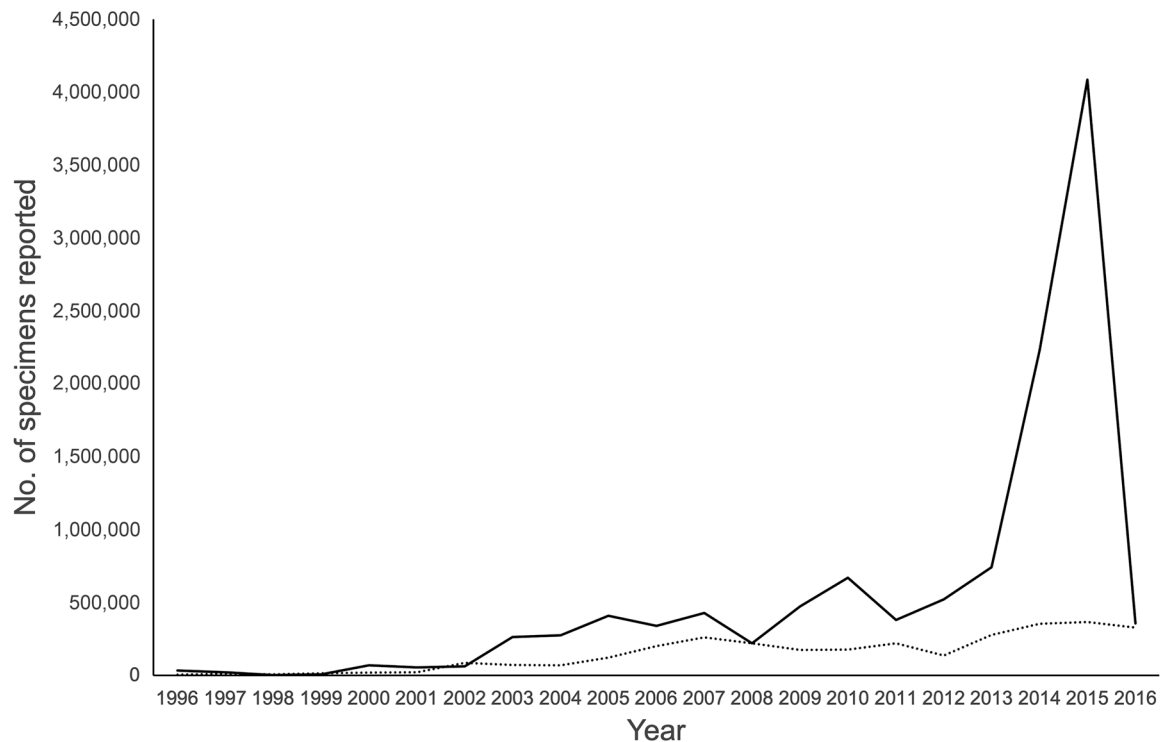


FIGURE 1 Number of live *Nepenthes* specimens recorded in the Convention on International Trade in Endangered Species (CITES) Trade Database as reported by importers (dashed line) and based on exports (solid line) from 1996 to 2016.

nized by the Species+ database or were present on the CITES Carnivorous Plant Checklist (von Arx et al., 2001). Based on responses from CITES management authorities of origin countries regarding whether CITES permits had ever been issued, all authorities provided a response (Appendix S3). These responses showed that CITES permits had been issued for only 5 of the above 32 species; origin countries stated that they had not issued permits for the remaining 26 species. This, however, does not rule out the possibility that trade occurred at the genus level (*Nepenthes* spp.). Indeed, 2,102,459 (exporter-recorded) live specimens were traded globally under the genus name *Nepenthes* spp. from 1996 to 2016.

An additional route by which material could enter the horticultural trade is via seeds because these are exempt from CITES and therefore would not be recorded by CITES management authorities or the CITES Trade Database. Based on responses from ABS National Focal Points of the origin countries to our query on whether collecting permits had ever been issued or agreements to commercialize as part of an ABS mechanism, only 2 of the 7 ABS National Focal Points provided a response (Appendix S3). The Department of Science Development, Science Policy and Evaluation Services, Queensland Government, Australia, confirmed that no authorization had been issued to collect the endemic *Nepenthes tenax*, nor had permission been granted for its commercialization, despite this species appearing in online trade. The Directorate of Biodiversity Conservation, Indonesia, listed a number of *Nepenthes* species that are protected and therefore cannot be collected in any form. Further, for other species not on this list but detected in trade and

described since 1996, it was confirmed no permits had been issued for export.

DISCUSSION

Of the 83 extant *Nepenthes* species described since 1996, 61% ($n = 51$) were traded online, and of these 51 species, almost two thirds ($n = 32$) had no trade recorded according to the CITES Trade Database. The CITES management authorities of range states were approached to confirm whether permits had ever been issued for any of these 32 species. All CITES management authorities approached provided a response and confirmed that CITES permits were issued for 5 species. This suggests that CITES permits had never been issued by the countries of origin for 27 (53%) of the 51 species in trade. Although this apparent lack of CITES permits may appear to be concerning, trade may have been permitted if *Nepenthes* spp. was used. This could well have been the case because none of the 32 species appeared in the standard nomenclature reference of CITES (von Arx et al., 2001) at the time and therefore could not be listed on a permit. This would explain why at least 5 species confirmed by CITES management authorities to have been issued permits did not appear in the CITES Trade Database. This raises concerns regarding nonuniformity in the issuance of CITES permits as it relates to nomenclature.

Although the use of *Nepenthes* spp. on permits may provide a route by which new species enter the trade, another potential route is through exemptions under CITES Annotation 4.

Under Annotation 4, seeds (4a) and material in vitro (4b) are exempt for all CITES Appendix II *Nepenthes* species (Schippmann, 2016). This is a significant route into the horticultural trade because *Nepenthes* are widely grown from seed, including seed that is then placed in vitro. As a result, this trade would not have been recorded in the CITES Trade Database or known to the CITES management authorities of the countries of origin. However, besides the fact that newly described species are often naturally rare, localized, and potentially confined to protected areas, collections and commercialization of any material, including seeds, may be subject to national legislation related to the Nagoya Protocol on ABS of the CBD. The ABS National Focal Points therefore represent an appropriate starting point to determine whether material has been legally collected and permitted to be commercialized. However, only 2 of the 7 ABS National Focal Points responded.

A further route into the trade for newly described species is through taxonomic changes. In some cases, species may already be in the trade because they are considered part of the natural variation of an existing species and traded as such. For example, *N. minima* had been in trade as *Nepenthes maxima* (Lake Poso) for a number of years prior to being described as a new species (Cheek & Jebb, 2016; Evans, 2009). *Nepenthes maxima* is a widespread and highly variable species that is well-established in horticulture. Likewise, *N. tenax* was previously considered to be part of the widespread *Nepenthes mirabilis* (Clarke & Kruger, 2006; McPherson, 2009). When asked about the export of *Nepenthes suratensis*, the Thai CITES management authority stated that they did not consider the species an “accepted name” and had therefore not issued permits for this species. This situation may be due to the fact that the species does not appear in the standard nomenclature for *Nepenthes* adopted by CITES (von Arx et al., 2001).

Such issues are not confined to the trade in *Nepenthes*; they also occur with other plant taxa collected for horticultural and other purposes. It is also relevant for the amphibian and reptile trade in which newly described species are in demand. For these communities, engaging in legal and ethically responsible acquisition requires access to information to make such decisions. The CITES Trade Database is easily accessible and, in our study, CITES management authorities were responsive to questions. However, the slow pace with which the standard nomenclature of CITES is updated and the fact that trade can take place at the genus level (e.g., *Nepenthes* spp.) create a knowledge gap in stakeholder decision-making and a barrier to improving traceability in the wildlife trade. Eighteen percent (exporter reported) of live *Nepenthes* specimens in the international trade entered as *Nepenthes* spp. from 1996 to 2016. This gap in knowledge is further exacerbated when certain parts and derivatives of CITES-listed species are exempt (e.g., seeds). Although the ABS National Focal Points would be an obvious starting point to determine whether material had been legally collected, the fact that only 2 of the 7 ABS National Focal Points responded is concerning and does little to assist stakeholders wishing to exercise due diligence.

Due diligence is a fundamental component of any wildlife trade to ensure the sustainability of the species on which the

trade depends, as well as the livelihoods and businesses that depend on the trade. This is particularly true with species listed on CITES that are already considered threatened by trade or may become threatened by trade. Undertaking due diligence exercises requires access to information on which to make such decisions. Although the ABS Clearing House (absch.cbd.int/en/) contains some useful information for such decision-making, information is still lacking—in our case, in relation to *Nepenthes*. This lack of information or response related to the issuance of collection and commercialization permits is concerning and hinders business people and consumers who want to undertake due diligence exercises to ensure their trade is legal, sustainable, and ethical.

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REFERENCES

- Averyanov, L., Cribb, P., Phan, K., & Nguyen, T. (2003). *Slipper orchids of Vietnam: With an introduction to the flora of Vietnam*. Royal Botanic Garden.
- CITES Secretariat, & UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). (2022). *A guide to using the CITES Trade Database. Version 9*. CITES.
- Cheek, M., & Jebb, M. H. P. (2016). *Nepenthes minima* (Nepenthaceae), a new pyrophytic grassland species from Sulawesi, Indonesia. *Blumea*, 61, 181–185.
- Clarke, C. M. (2014). *Nepenthes rigidifolia*. The IUCN Red List of Threatened Species 2014: e.T49002226A49009927.
- Clarke, C. M., & Kruger, R. (2006). *Nepenthes tenax* C. Clarke and R. Kruger (Nepenthaceae), a new species from Cape York Peninsula, Queensland. *Austrobaileya*, 7, 319–324.
- Christenhusz, M. J. M., & Byng, J. W. (2016). The number of known plant species in the world and its annual increase. *Phytotaxa*, 261, 201–217.
- Convention on Biological Diversity (CBD). (2016). *The Nagoya Protocol on Access and Benefit-Sharing*. <https://cbd.int/abs>
- Evans, D. P. (2009). New cultivars: *Nepenthes maxima* ‘Lake Poso’. *Carnivorous Plant Newsletter*, 38, 18–22.
- Gale, W. S., Kumar, P., Hinsley, A., Cheuk, M. L., Gao, J. Y., Liu, H., Liu, Z. L., & Williams, S. J. (2019). Quantifying the trade in wild-collected ornamental orchids in South China: Diversity, volume and value gradients underscore the primacy of supply. *Biological Conservation*, 238, Article 108204.
- Margulies, J. D., Bullough, L. A., Hinsley, A., Ingram, D. J., Cowell, C., Goettsch, B., Kiltgård, B. B., Lavorgna, A., Sinovas, P., & Phelps, J. (2019). Illegal wildlife trade and the persistence of “plant blindness”. *Plants, People, Planet*, 1, 173–182.
- McPherson, S. R. (2009). *Pitcher plants of the old world* (Vols. 1–2). Redfern Natural History Productions Ltd.
- Roberts, D. L., Mun, K., & Milner-Gulland, E. J. (2022). A systematic survey of online trade: Trade in Saiga antelope horn on Russian-language websites. *Oryx*, 56, 352–359.
- Robinson, J. E., & Sinovas, P. (2018). Challenges of analyzing the global trade in CITES-listed wildlife. *Conservation Biology*, 32, 1203–1206.
- Schippmann, U. (2016). *Plant annotations in the CITES Appendices – Implementation manual – Version 1.0*. Bundesamt für Naturschutz (BfN), Federal Agency for Nature Conservation. https://cites.org/sites/default/files/ndf_material/Schippmann_Manual_of_Annotations_V1_2016.pdf
- Tensen, L. (2016). Under what circumstances can wildlife farming benefit species conservation? *Global Ecology and Conservation*, 6, 286–298.

- von Arx, B., Schlauer, J., & Groves, M. (2001). *CITES carnivorous plant checklist for the genera: Dionaea, Nepenthes and Sarracenia*. Royal Botanic Gardens.
- Wong, S., & Liu, H. (2019). Wild orchid trade in a Chinese e-commerce market. *Economic Botany*, 73, 357–374.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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