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ACCEPTED MANUSCRIPT

**High altitude species, high profits: can the trade in wild harvested *Fritillaria cirrhosa* (Liliaceae) be sustained?**

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## ABSTRACT

### ***Ethnopharmacological relevance***

*Fritillaria cirrhosa* D. Don bulbs contain alkaloids and are one of the most intensively exploited alpine Himalayan medicinal species. In terms of proprietary medicines, our study shows that 210 *F. cirrhosa* products are offered by 46 suppliers, most of which (44) are situated in China and two in Nepal. A widespread commercial use is as one of the main ingredients in cough syrups. A well known example is "Nin Jiom Pei Pa Koa Herbal Cough & Throat Syrup", which typically contains more *F. cirrhosa* than any other herbal ingredient in the formulation. The biggest market for *F. cirrhosa* bulbs is China, where demand exceeds supply of this wild harvested species for use in traditional Chinese medicine (TCM). Cross-border trade from Nepal to China occurs in significant quantities. Bhutan also imports *F. cirrhosa* bulbs from Nepal. In addition, *F. cirrhosa* is registered as an active ingredient in traditional herbal medicinal preparations in Australia, Canada, Hong Kong SAR, Malaysia, Republic of Korea, Singapore and Taiwan. There is also an export trade in *F. cirrhosa* to Europe. Assessing how much *F. cirrhosa* is traded is complex, however, due to a "look-alike" challenge, as nine Chinese *Fritillaria* species are traded in Europe (*Fritillaria cirrhosa*, *F. delavayi*, *F. hupehensis*, *F. pallidiflora*, *F. przewalskii*, *F. thunbergii*, *F. unibracteata*, *F. ussuriensis* and *F. walujewii*).

### ***Aims of the study***

The aims of this review were to assess the scale of the global trade in *F. cirrhosa*, and to synthesise studies of the impacts of wild harvest on *F. cirrhosa* populations and on the extent of emerging cultivation initiatives as an alternative to wild harvest.

### ***Methods***

Firstly, we reviewed published information on studies on impacts of wild *F. cirrhosa* harvest from across the geographic range of this species. Secondly, global trade data for *F. cirrhosa* were analysed.

### ***Results***

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