

Taxonomic Status of *Saussurea costus* (Falc.) Lipsch. (Asteraceae: Cardueae): a critically endangered species from Himalaya, India

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Abstract

The taxonomic status of *Saussurea costus* (Falc.) Lipsch. (Asteraceae: Cardueae) is discussed along with emphasis on alternative names under genera like *Aucklandia* Falc., *Dolomiaea* DC. and *Frolovia* (DC.) Lipsch. It is widely used for its medicinal properties and listed in Appendix I of CITES as critically endangered species. The present communication will help to eliminate prevailing confusion among taxonomists, conservationists, herbal drug dealers and pharmaceutical industry. Brief account of the genus *Saussurea* along with detailed history of the species is provided.

Key words: *Aucklandia*, *Dolomiaea*, *Frolovia*, Nomenclature

INTRODUCTION

Saussurea DC. (Asteraceae: Cardueae) includes approximately 400 species distributed mainly in cool temperate (holarctic and arctic) regions of the world (Lipschitz 1979; Raab-Straube 2003; Kita et al. 2004; Butola & Samant 2010). In India, the genus is represented by c. 62 species (Hajra 1988; Hajra *et al.*, 1995). The genus shows distribution in a wide range of habitats from temperate to alpine zones of Himalaya, lowland, stony places, open slopes, forest clearings and even in wastelands. Majority of species are found in areas with altitude higher than 1000m above sea level. Sino-Himalayan and Central Asian regions show maximum number of species and greatest diversity of the genus (Haffner 2000; Fujikawa & Ohba 2003). It has its center of diversity in Asia (Lipschitz 1979), with possibly only one secondary radiation in Europe and America (Dickore 2001). China comprises maximum diversity of species with c. 289 species, out of which 191 have been reported to be endemics (Raab-Straube 2003; Shi *et al.* 2011). Lipschitz (1979) in his infrageneric classification of *Saussurea* recognized six subgenera and twenty sections.

Saussurea costus (Falc.) Lipsch., commonly known as Costus or Kuth, belongs to subgenus *Frolovia* (DC.) Lipsch. and is distributed in Himalayan region of India (Himachal Pradesh, Jammu & Kashmir, Uttarakhand) China (cultivated) and Pakistan (wild) (Hajra 1988; Pandey *et al.* 2006, Shi *et al.* 2011). It was originally described by Falconer (1841) as *Aucklandia costus*, in *Annals and Magazine of Natural History*, under a new monotypic genus *Aucklandia* in the honor of Lord Auckland, based on his own collection from Kashmir. While describing the genus, Falconer stated that it is related to the genus *Saussurea*. In 1843, Joseph Decaisne (Voy. Inde [Jacquemont] 4(Bot.): 96, t. 104) described it as *Aplotaxis lappa* based on Jacquemont's collection from Kashmir. Carl Heinrich Schultz ("Bipontinus") in 1847 transferred most of the species from genus *Aplotaxis* to *Saussurea* and treated

Aplotaxis lappa Decne. as a synonym of *Saussurea lappa* Sch. Bip. In 1891, Kuntze used *Theodorea* Cass. as the correct name of this genus and reduced *Saussurea* DC. to its synonymy as Salisbury (1807) had already named a genus of Liliaceae as *Saussurea*. Now, *Theodorea* is a subgenus under *Saussurea*, named in the honor of Theodore de Saussure. Hence, *Aucklandia costus* Falc. was changed to *Theodorea costus* Kuntze. Later, *Saussurea* DC. was conserved against *Saussurea* Salisbury (1807). This leads to acceptance of *Saussurea costus* as the correct name instead of *Theodorea costus* in 1964. *Aucklandia costus* is basionym of *Saussurea costus*. In the Flora of China (Shi et al. 2011), it is accepted under the monotypic genus *Aucklandia* Falc.

Molecular systematic studies using nrDNA (ITS) and cpDNA (*trnL-F*, *psbA-trnH*) with multiple accessions and sampling from Pan-Himalaya have revealed that the accessions of *Saussurea costus* collected from different localities in Jammu & Kashmir and Uttarakhand, India) along with accessions from China recovers the species as monophyletic and its placement in the *Dolomiaea* clade (Wang *et al.*, 2007). All these data support the placement of *S. costus* in the genus *Dolomiaea* DC.

Saussurea costus is a widely used name in the taxonomic and ayurvedic literature of India and China (Pandey *et al.* 2007; Butola & Samant 2010). The species is native to North-West India and North-East Pakistan, but widely cultivated in China and Nepal for its medicinal properties (Hajra, 1988; Hajra *et al.* 1995; Kuniyal *et al.* 2005; Butola & Samant 2010; Shi *et al.* 2011). The roots of this plant are used for the treatment of various ailments like rheumatism, ulcer, leprosy and dysentery and are traded in international markets for use as drugs (Pandey *et al.* 2007). The presence of strong aromatic odour in the roots of this plant makes it highly useful in perfume and incense industry. In tribal areas, the roots are also used as insecticides to protect clothes from damage (Mittre, 1981). The species is also known to possess important bioactive molecules like Costunolide and Cynaropicrin, which makes it a highly useful plant (Pandey *et al.* 2007). Due to the high demand of this species in pharmaceutical industry, it has been highly over harvested from wild and is now considered as critically endangered and is enlisted in *Appendix I* of CITES. The high economic importance of this species and common name Costus or Kuth make it necessary to discuss its taxonomic status.

Under such a taxonomic background, the species is to be treated as:

Saussurea costus (Falc.) Lipsch., Bot. Zhurn. (Moscow & Leningrad) xlix. 131 (1964). 131. 1964. *Aucklandia costus* Falc., Ann. Mag. Nat. Hist. 6: 475. 1841; *Theodorea costus* Kuntze, Revis. Gen. Pl. 1: 368 368. 1891. *Aucklandia lappa* Decne, Iconographia Cormophytorum Sinicorum 4: “643, f. 6700”. 1875.

Specimens examined: INDIA, **Himachal Pradesh**, Chitkul, 17 Aug. 1973, *K.P. Janardhanan* 52774 (BSD); Lahul, Chhatru, 5 Sept. 1961, *N.C. Nair* 16669 (BSD); Lahul, Koksar, 2 Aug. 1971, *U.C. Bhattacharyya* 44987 (BSD); Lahul, Koksar, 5 Sept. 1985, *P.K. Hajra* 76995 (BSD); Lahul, Kyelong, 14 July 1941, *N.L. Bor* 9934 (DD); Lahul, Sissu, 26 June 1958, *M.A. Rau* 5919 (BSD); Lahul, Sissu, 5 July 1938, *N.L. Bor* 12320 (DD); Nichar, 28 May 1962, *N.C. Nair* 22065 (BSD). **Kashmir**, Jahlma, Nalda-Jasrath Reserve, Pattan valley, 10 June 1958, *SP Sethi* (DD); JojuBasa to Guru Kot, 22 Sept. 1838, *H. Falconer* s.n. (DD); Kashmir, *H. Falconer* s.n. (K); In montibus supra Pendjegam, *V. Jacquemont* 900 (P); In sylvisexub. mont. Vestervonne “inter” Cachemir, *V. Jacquemont* 727 (P); Keyan forest, Kamah basin, Kishanganga valley, 12 July 2006, *Keshavanand* 207 (DD); KilshaiBala in Tilal, Kishanganga valley, 25 Sept. 2009, *Keshavanand* 1576 (DD); Kunpathri, below masitnagar in Tilal, Kishanganga, 13 Sept. 2009, *Keshavanand* 1515 (DD); Rambani, 27 June 1925, *Sher Singh*

(DD); Shakhara stream, Jagran basin, 5 Aug. 2006, *Keshavanand* 355 (DD); Sonmarg, Sind valley, 5 Aug. 1891, *G.A. Gamm* (DD); Thajwas mountains, 18 June 1959, *T.A. Rau* 9563 (BSD); Western Kashmir, *Jacquemont*, V. 1142 (K); **Uttarakhand**, Chamoli district, North of Bumpa, 6 Sept. 1975, *B.D. Naithani* 56102 (BSD); Dronagiri, *P.K. Hajra & Bipin Badoli* 87551 (BSD); Garhwal, Buhna, 15 June 1959, *M.A. Rau* 10209 (BSD).

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CONCLUSIONS

Replacing this well-established name with any other less known name, especially under a different genus, will create confusion to taxonomists, conservationists, herbal drug dealers and pharmaceuticals. Considering the fact that *S. costus* is widely used for its medicinal value and is also listed as critically endangered, changing its name is not recommended.

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