

THE GENUS *HOVENIA* THUNB. (RHAMNACEAE) IN THE INDIAN SUBCONTINENT

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ABSTRACT

The Himalayan *Hovenia* described by Lindley in 1820 as *H. acerba* was subsequently merged by him with *H. dulcis* Thunb., a species occurring in Japan and China. Y. Kimura in 1939 in his revision of *Hovenia* retained *H. acerba* distinct from *H. dulcis*. The authors have studied the literature and material on *Hovenia* in Central National Herbarium and conclude that *H. acerba* should be treated as a variety under *H. dulcis*, *H. dulcis* var. *acerba*, comb. et stat. nov. *H. parviflora* Nakai et Kimura from South China is reduced as synonym of *H. dulcis* var. *acerba*. *H. dulcis* properly named as *H. dulcis* var. *glabra* Makino is treated as a taxonomic, if not nomenclatural synonym, of *H. dulcis* var. *dulcis*, and is reported from the Indian sub-continent from the Garhwal Himalayas and Arunachal Pradesh.

Hovenia Thunb., with about 8 species from the warm temperate zone of the Sino-Japanese region extends westwards to the Himalayas. J. Lindley in 1820, described *H. acerba* from a plant grown in Lambert's greenhouse in Boyton, England, the seeds of which were sent by Wallich from Calcutta. This in turn had been introduced in the Sibpur (Calcutta) garden in 1802-03 by F. Buchanan-Hamilton from Nepal. Buchanan considered the tree to have been "brought from China or some country subject to it." Lindley distinguished *H. acerba* from the widespread Sino-Japanese *H. dulcis* Thunb. by its entire leaves and unpalatable 'fruits', but in 1821 he merged the two species together because he found that the leaves of the former were actually serrated as in *H. dulcis* and the 'fruits' had "not ripened to the perfection it achieved in its native country" The 'fruits' in *H. dulcis* are actually the thickened, pulpy sweet, edible peduncles, and *H. dulcis* is widely cultivated for it.

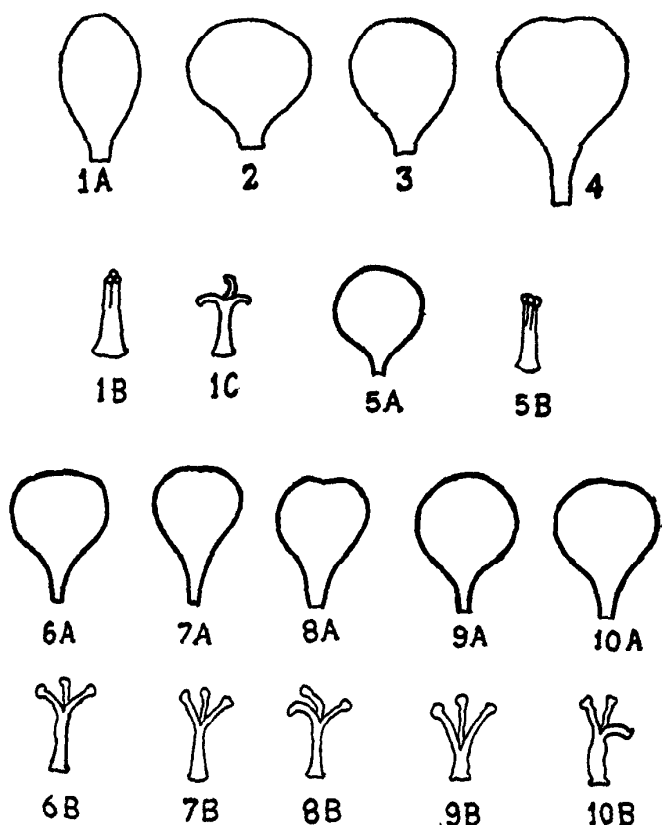
In the Indian sub-continent the sub-tropi-

cal *Hovenia* extends from Punjab to Nagaland, the foothills and plains of northern Bengal, in Assam and Meghalaya. Till the mid 1960's, this *Hovenia* has been cited in literature as *H. dulcis*. In 1939, Y. Kimura revised *Hovenia* in which he treated *H. acerba* native to China and distinct from the Japanese *H. dulcis*. Momiyama in 1966 in Hara's 'The Flora of Eastern Himalayas' was the first to adopt Kimura's treatment and the name *H. acerba*, and subsequently this has been followed by Hara in 1979 and Balakrishnan in 1981.

In the Central National Herbarium where all materials till now were kept under *H. dulcis*, the authors attempted to segregate specimens belonging to the several species of *Hovenia* with the help of Kimura's revision. With a lot of difficulty *H. acerba* could be segregated from *H. dulcis* for which their protologues, Thunberg's specimen (microfiche), Lindley's plates and subsequent literature were studied. Characters used by Kimura to separate out the two species were found to be mostly variable and the distinctions not clear. These have been discussed in the following paragraph.

The leaf serration in *Hovenia* is a very variable feature. Lindley in 1823 quotes D. Don, that "as the trees advance in age. leaves (become) deeper serrated". Lindley was also misled in assessing this feature, as already pointed out. In the herbarium there are numerous instances of sub-entire, crenate-serrulate to deeply serrated margins occurring on leaves of the same specimens. However, most specimens referable to *H. dulcis* have leaves with a tendency towards coarse serrations. Another observation is that on attaining maturity, the long-acuminate apex of young leaves turn into short-acuminate ones. The degree of acumination also depends on overall shape of the leaf, which itself is variable. Not all material referable

to *H. dulcis* have the short-acuminate leaf apex, whereas both types of apex are found in *H. acerba*. In *Hovenia*, terminal inflorescences are usually asymmetrical, while the axillary ones are symmetrical. Both types occur in the two species though the terminal type is more prevalent in *H. dulcis*. The anastomosing nerves on sepals are indistinct to distinct in *H. acerba*. The shape of petal observed is at maximum variance with Kimura's observations on it. In *H. acerba* this feature is found to be extremely variable (Figs. 6A-10A) and is similar to the shapes designated by Kimura for *H. acerba* (Fig. 2), *H. parviflora* Nakai et Kimura (Fig. 3) and *H. robusta* Nakai et Kimura (Fig. 4). The latter two species are newly described by Kimura in his paper. The only flower-bearing *H. dulcis* in herb. CAL, (Maximowicz s. n.) from Japan, has petals (Fig. 5A) different from those depicted by Kimura for *H. dulcis* (Fig. 1A), but are more similar to those of Kimura's *H. acerba* (Fig. 2) and *H. parviflora* (Fig. 3). Kimura stated that in young flowers of *H. dulcis* the style arms remain erect (Fig. 1B) in contact with one another (only this condition is found in our *H. dulcis* material), while they spread out in mature ones (Fig. 1C). In the specimens of *H. acerba* the division of the style arms is a variable feature and is sometimes like those in mature flowers of *H. dulcis* (Figs. 6B, 7B) illustrated by Kimura, or they are free upto nearly two-third the length of the style (Fig. 9B) but never free from near the base of the style as stated by Kimura. This feature is a confusing one because its expression is linked to the ageing process of the flower and difficult to evaluate properly and is liable to misinterpretation.



1. *H. dulcis* Thunb.—A. Petal ; B. Style (young flower) ; C. Style (mature flower). 2. *H. acerba* Lindl.—Petal. 3. *H. parviflora* Nakai et Kimura—Petal. 4. *H. robusta* Nakai et Kimura—Petal. 5. *H. dulcis* Thunb. (Maximowicz s. n.)—A. Petal ; B. Style. 6-10 : *H. dulcis* var. *acerba* (Lindl.) Sengupta et Safui—A. Petal ; B. Style : (6. G. King s.n. acc. no. 89381 ; 7. J. F. Duthie 23092 ; 8. Strachey & Winterbottom 222 ; 9. Mackinnon s.n. acc. no. 89370 ; 10. J. F. Duthie 22564). (Figures 1-4, after Kimura, 1939).

The preceding discussion suggests that many of the diagnostic characters used by Kimura are more quantitative rather than qualitative in nature, and variations in these lead to blurring of differences between *H. dulcis* and *H. acerba*. It would be appro-

priate to treat these variations within the range of one species, *H. dulcis*, but in consideration of the quantitative diagnostic features as set out in the key, the authors propose to reduce *H. acerba* as a variety under the former, as *H. dulcis* var. *acerba*, *comb. et stat. nov.*

Kimura provided photographs of several *Hovenias* in his paper, of which the one of *H. parviflora*, described from a solitary specimen from South China is its type. *H. parviflora* has features common with both *H. dulcis* and *H. dulcis* var. *acerba* (*H. acerba*), but is closer to the latter. The leaves on the type has both long—as well as short—acuminate apex and more like those of *H. dulcis* var. *acerba*. The smaller flowers may reflect their immature condition with hardly trifid style apex. As earlier stated, the nature of style is difficult to evaluate properly. It is apparent that *H. parviflora* is nothing but a juvenile form (with regard to its flowers) of *H. dulcis* var. *acerba* and is reduced as a synonym of it.

The type of *H. inaequalis* DC. (1825) viz. "Napaulia, Wallich" has been examined in microfiche of De Candolle's herbarium (G-DC). One sheet (microfiche no. 284-17) bears a printed label "Napaul Wallich 1821" and a hand-written label "*Hovenia dulcis* β *inaequalis* DC." The distinguishing features given by De Candolle are the oblique and 3-nerved leaf base with veins bipartite at their lower extremities. A careful examination of the microfiche, however, does not show bipartite branching of two of the three basal veins; they produce only short lateral veins towards the margin. That the leaf bases are unequal-sided is a feature shared by other *Hovenias* including *H. dulcis* var. *acerba*. It is presumably on such considerations that Kimura reduced *H. inaequalis* as a synonym of *H. acerba*.

Kimura retained in his paper the name *H. dulcis* var. *glabra* Makino for the typical

H. dulcis, with the comment "This name was proposed by Dr. T. Makino to distinguish the typical *Hovenia dulcis* from *H. (Sphalm "T") tomentella* (*H. dulcis* var. *tomentella*). Unless Makino, in 1914, had typified var. *glabra* by a type of its own, *H. dulcis* var. *glabra* Makino must be rejected as a *nom. illegit.* (Art. 26 & Art. 63.1 of the Code) and replaced by *H. dulcis* var. *dulcis*. *H. dulcis* var. *dulcis* is also reported from India from the Garhwal Himalayas and Arunachal Pradesh.

A solitary specimen of G. Mann from Assam plains has vegetative features similar to that in *H. robusta* Nakai et Kimura, from China, but in the absence of flowers and fruits its identity and status would have to remain unconfirmed.

KEY

- 1a. Leaves 15-20 cm long; sepals & fruits densely brown tomentellous; petals 3-3.5 mm long; style arms free from base .. *H. robusta*
- 1b. Leaves up to 15 cm long; sepals & fruits glabrous; petals 2-2.5 cm long; style arms not free from base :
- 2a. Inflorescence mostly terminal and asymmetrical, occasionally axillary; sepals without prominent anastomosing nerves; style arms divided up to a quarter of the style .. *H. dulcis* var. *dulcis*
- 2b. Inflorescence terminal and axillary and the latter symmetrical; sepals usually with more or less anastomosing nerves; style arms divided from a quarter to two-thirds of the style .. *H. dulcis* var. *acerba*

1. ***Hovenia dulcis*** Thunb. Nov. Gen. 1: 8. 1781 et Fl. Jap. 101. 1784; Lam. Encycl. 3: 138. 1789; Willd. Sp. Pl. 1(2): 1141. 1797; DC. Prodr. 2: 40. 1825; Sieb. et Zucc. Fl. Jap. 135. t. 73-74. 1826.
Type: Crescit prope Na(n)gasaki, 1776, Thunberg s. n. (UPS).
var. ***dulcis***

H. dulcis var. *glabra* Makino in Bot. Mag. Tokyo 28: 155. 1914; Kimura in *ibid.* 53: 475. pl. 7(1). f. 1-5. 1939.

Type : (?) Same as for *H. dulcis* var. *dulcis* (see Kimura, 1939).

Specimens examined : INDIA : Uttar Pradesh—Garhwal, Lohba, 5000 ft, 18 Aug. 1912, D. Hooper 38983. Arunachal Pradesh (N.E.F.A.) without precise locality, R. Sheshagiri Rao 1530. CHINA : Central China—Hupeh Prov., 1885-88, A. Henry 2945. Tsingtan, 1901, Zimmermann 461. JAPAN : Yokohama, 1862, Maximowicz s.n.

2. *H. dulcis* var. *acerba* (Lindl.) Sengupta et Safui *comb. et stat. nov.*

H. acerba Lindl. in Bot. Reg. 6 : t. 501. 1820 ; DC. Prodr. 2 : 40. 1825 ; Kimura in Bot. Mag. Tokyo 53 : 477. pl. 7(2). f. 16. 1939 ; Momiyama in Fl. E. Himal. 197. 1966 ; Hara in Hara & Williams, Enum. Fl. Plts. Nepal 2 : 91. 1979 ; Balakrishnan, Fl. Jowai 1 : 134. 1981.

Type : (?) China (from a plant grown in Lambert's greenhouse in Boyton, England ; raised from seeds obtained through Wallich, from Calcutta from a tree introduced in the Sibpur Garden by Buchanan-Hamilton in 1802-03 from Nepal derived originally from China), Lindley s.n. (CGE).

H. dulcis sensu Lindl. in Bot. Reg. 7 : in appendix, 1821 et Bot. Mag. 50 : t. 2360. 1823, (non Thunb. 1781) ; Roxb. Fl. Ind. 2 : 414. 1824 ; D. Don, Prodr. Fl. Nep. 189. 1825 ; Wall. in Roxb. Fl. Ind. 1 : 630. 1832 ; Royle, Illus. Bot. 1 : 169. 1839 ; Stewart & Brandis, For. Fl. N. W. Centr. Ind. 94. 1874 ; Laws. in Hook. f. Fl. Brit. Ind. 1 : 640. 1875 ; Brandis, Ind. Trees 174. 1906 ; Bamber, Pl. Punj. 10. 1916 ; Osmaston, For. Fl. Kumaon 108. 1927 ; Parker, For. Fl. Punj. Haz. & Delhi ed. 2. 90. 1924 ; Cowan & Cowan, Trees N. Beng. 37. 1929 ; Kanjilal et al. Fl. Assam 1(2) : 282. 1936 ; Kimura in Faun. Fl. Nep. Himal. 1 : 177. 1952-53 ; Wealth of India 5 : 133. 1959.

H. inaequalis DC. Prodr. 2 : 40. 1825.

Lectotype : "Napaul 1821" Wallich s.n. Herb. De Candolle 284-19(G-DC) (selected here),

H. parviflora Nakai et Kimura in Bot. Mag. Tokyo 53 : 478 : pl. 7(3). f. 16. 1939, *syn. nov.*

Type : South China, Prov. Kwantung, Loh Kong Tung, Chuk Ko Uen, May 22, 1925 F. A. McClure s.n. (TI).

Specimens examined : INDIA : Himachal Pradesh—Chamba State, Sao valley, 4000 ft., 9 June 1895, J. H. Lace 750. Uttar Pradesh—Garhwal, Stoliczka s.n. ; Pindai valley, nr. Bagerui, 3000 ft, 7 May, 1848, R. Strachey & J. E. Winterbottom S. 542 (?) ; Bysance, 4000 ft, 31 May 1848, R. Strachey & J. E. Winterbottom 222 ; Tehri-Garhwal, nr. Phadi, 4-5000 ft., Oct. 1881, J. F. Duthie 2263 ; Thadyari, 3-4000 ft., 22 May 1899, J. F. Duthie 22564 ; Mussoorie, 6000 ft., Nov. 1896, P. W. Mackinnon s.n., 20 Nov. 1896, P. W. Mackinnon s.n., 6-7000 ft., July 1899, P. W. Mackinnon s.n., 20 June 1900, J. F. Duthie 23092, May, 1897, P. W. Mackinnon s.n. Sikkim—Sikkim Himalayas, 2000 ft., 13 May 1876, G. King s.n. ; 4000 ft., S. Kurz s.n. ; regio. trop., 3-5000 ft., J. D. Hooker 427 ; Rungit, 1000 ft., 15 May 1876, C. B. Clarke 27963 B ; Sikkim Himalaya, G. A. Gammie s.n. Arunachal Pradesh—Abor expedition, Kobo, 10 Dec. 1911, I. H. Burkill 37090 (2 specimens). Nagaland—Jaboca, 5000 ft., Dec. 1898, Prain's Collector 67 (5 specimens). West Bengal—Preng Cola (?), Munsong, 4700 ft., 3 Dec. 1908, W. G. Craib 510 ; Mangpo, 15 Dec. 1901, Prain's Collector 435 ; Darjeeling, Nov. 1893, Manson (?) s.n. Assam—Upper Assam, G. Mann s.n. NEPAL : Napalia, 1821, Wallich Num. list 4274 A : HBC e Napalia ; Wallich Num. list 4274 C (2 specimens) ; Napaul, 1818, Wallich s.n. (ex herb. R. Brown) (2 specimens) ; Khebang-Bharomdin, 24 Nov., H. Hara et al. 6306653. BHUTAN : Chumbi valley road survey : Chummchi valley, 800-900 ft., Jan. 1905, G. L. Searight 198. CHINA : Yunnan-Fo-Hai, 1540 m, June 1936, C. W. Wang 743222 ; Mengsoong, Dahmeng-lung, Che-li Hsien, 1800 m, Sept. 1936, C. W.

Wang 78540. Kweichow Prov.—600 m, 27 Sept. 1931, *A. N. Stewart, C. Y. Chiao & H. C. Cheo* 539; Tungtze, 400 m, 17 May 1930, *Y. Tsiang* 4921.

3. ? **H. robusta** Nakai *et* Kimura in Bot. Mag. Tokyo 53 : 479. 1939.

Types : China; S. Anhwei, Chu Hwa Shan, June 28, 1925, *Ren-Chan Ching* 2802 (flowering) (K); Wangshan, Oct. 1933, *W. C. Cheng* 3984 (fruiting) (TI).

Specimen examined : INDIA : Assam—Plains forest of Assam (Brahmaputra plains), *G. Mann* 61.

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