NOTE

Cornus kousa F. Buerger ex Hance subsp. *kousa* (Cornaceae), a New Record from India

Arun Chettri[1,2], S. K. Barik[1*], Bikarma Singh[1], D. Adhikari[1] and M. K. Lyngdoh[1]

1. Centre for Advanced studies in Botany, North-Eastern Hill University, Shillong 793022, Meghalaya, India.
2. Department of Plantation Management and Studies, School of Sustainable Development and Livelihood Management, Sikkim University, Tadong-Gangtok 737102, India.
** Corresponding author. Email: sarojkbarik@yahoo.com*

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ABSTRACT: We present a new record of the dogwood tree (*Cornus kousa* F. Buerger ex Hance subsp. *kousa*) (Cornaceae) from the Eastern Himalayas in India. This record extends the known geographical distribution of *C. kousa* from China, Republic of South Korea and Japan to Eastern Himalayas of the Indian biome. With this report, the distribution of the subspecies *kousa* is also extended from Japan and Korea to India. The species was discovered from Khangchendzonga Biosphere Reserve (27°06'-28°05'N, 88°02'-88°47'E) in the state of Sikkim in the Eastern Himalayas. This discovery modified the current distribution of *C. kousa* in the world.

KEY WORDS: *Cornus*, Cornaceae, India, new record, threat status.

INTRODUCTION

India is rich in plant diversity and home to several endemic, taxonomically important and threatened species (Chettri et al., 2010). It is considered as one of the 12 mega-biodiversity countries of the world, having ca. 47,000 plant species. The Eastern Himalaya extends over an area of 1500 km^2 in the states of Sikkim, West Bengal, Arunachal Pradesh and Nagaland. Being at the meeting point of Indo-Malayan and Indo-Chinese biogeographical realms as well as Himalayan and peninsular Indian region, it contains the floristic elements from all these biogeographical zones.

During the floristic exploration and biodiversity survey of Khangchendzonga Biosphere Reserve (KBR) in Sikkim (27°04'N-28º07'N & 88º01'E-88'55°E) (Fig. 1), we collected a tree specimen belonging to the genus *Cornus* L. (Cornaceae). After a critical study, the specimen was identified as *Cornus kousa* F. Buerger ex Hance subsp. *kousa* (Fig. 2).

Following repeated exploration in the KBR based on 10 x 10 km^2 grid survey, we could locate only one population of the species in the study area. The population had only four trees and the total area of occurrence was approximately two hectare. The habitat of this taxon was sandwiched between the buffer zone of KBR and the Government managed reserved forest. The habitat of the species is characterised by hill slopes, riverine areas and road side ruderal areas. The species was located in the subtropical montane forest at an elevation of 1,200 – 2,500 m asl (above sea level). This forest was classified by Champion and Seth (1968) as East-Himalayan subtropical wet-hill forest.

Cornaceae (dogwood) is a cosmopolitan family of flowering plants and is represented by ±110 species. Most of the members are deciduous or evergreen tree and shrub species. The members of this family have simple, opposite leaves, or sometimes alternate. The four- or five-petal flowers are clustered together in the form of inflorescence called pseudanthia (Kubitzki, 2004). The fruits are drupaceous in nature. As far as the systematic position of the family is concerned, the name Cornaceae is unsettled and controversial. A number of genera have been added to this family and also removed from it eventually from time to time (Eyde, 1988). The molecular phylogeny study of the family has clarified the relatedness of some associated genera. These studies have eliminated nine genera from the order Cornales (Fan and Xiang, 2003), that were previously included in the family Cornaceae. However, the Angiosperm Phylogeny Group (APG) defined Cornaceae with the genera *Cornus* L. and *Alangium* Lam. (APG III, 2009). The genus *Cornus* L. consists of approximately 58 species distributed in the temperate and subtropical regions of the Northern Hemisphere (Xiang et al., 2006). However, according to a revision work on the genus *Cornus* by Matthew and Alamelu (1988), the genus is represented by only 3 species in India, viz. *C. capitata*, *C. macrophylla* and *C. oblonga*. The intermediate geographical location of Himalayas with

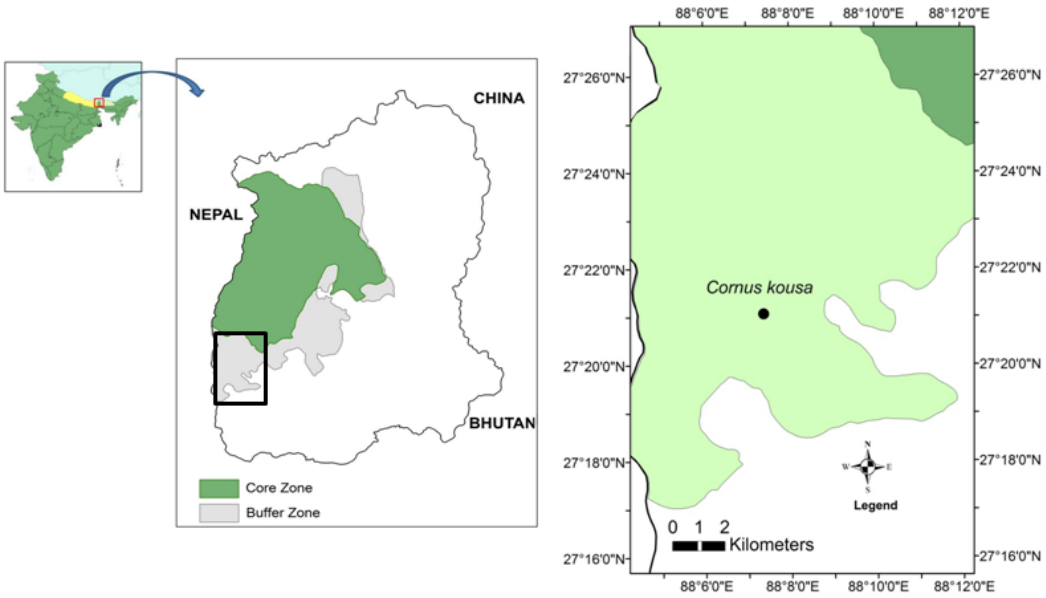

Fig. 1. Location of *C. kousa* subsp. *kousa* in Khangchendzonga Biosphere Reserve, Sikkim, India in Eastern Himalayas.

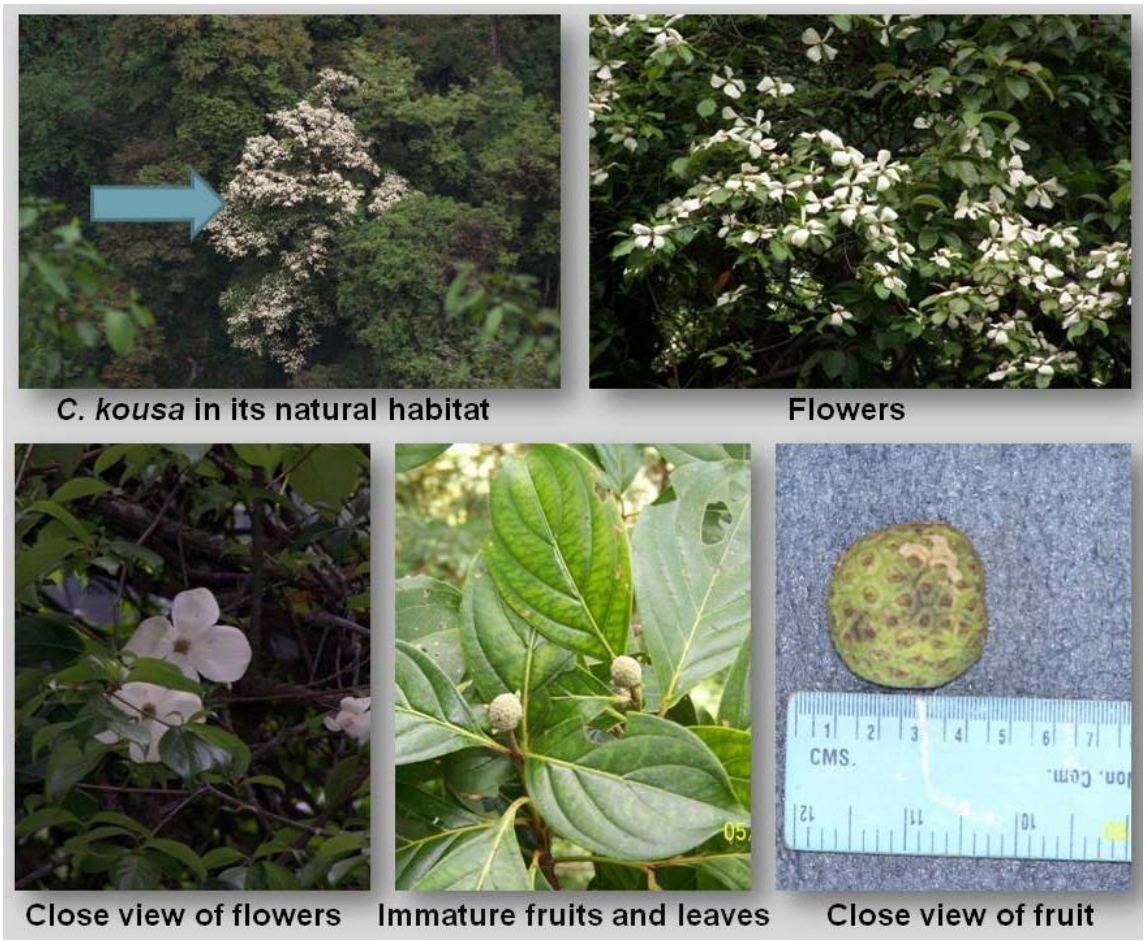

Fig. 2. *Cornus kousa* subsp. *kousa* in natural habitat with flowers and fruits.

Table 1. Differences between *Cornus kousa* and *C. capitata*.

Cornus kousa	*Cornus capitata*
a) Found in tropical to subtropical forest	a) Found in subtropical to temperate forest
b) Deciduous, trees or shrubs to 11 m in height	b) Evergreen, trees or shrubs to 15 m in height
c) Leaves narrowly elliptic to oblong-lanceolate, 5.6-8.8 × 3.1-5.2 cm, lateral nerves 3, 4 or 5	c) Leaves narrowly elliptic to oblong lanceolate, 4-12 × 2-4 cm, lateral nerves 3 or 4
d) Cymes globose, 20-35 flowered	d) Cymes globose, 50-100 flowered
e) Drupes red at maturity, 3-3.5 cm in diam., globose	e) Drupes purple to red at maturity, 1.5-3 cm in diam., compressed or globose

extreme climatic conditions may have favoured its sustenance in the region (Garg and Husain, 2010). The present new record adds one more to the list in the form of *Cornus kousa* F. Buerger ex Hance, to the flora of India. This species has not been reported by any worker from India till date.

We collected this species from KBR (N 27°21'.53 & E 88°07'.03) during the floristic study in the year 2008. The examined specimens of *C. kousa* (*A. Chettri et al. 11898*) were processed following standard herbarium techniques (Jain and Rao, 1977). The specimens were prepared and deposited in ASSAM herbarium at Botanical Survey of India and in the University herbarium (NEHU), Department of Botany. The study is based on our own specimens collected from the field and photographs taken. The specimens were compared with the detailed description of closely resembling species of *C. capitata*. Comparison of these two species resulted in contrasting differences in some of the morphological characters (Table 1). The habitat conditions of the species were recorded and edapho-climatic conditions were measured. Till date this species has not been classified from a threat perspective. Therefore, in the present study, we provide detailed taxonomic description, photographs, location map and threat status of *C. kousa*.

TAXONOMIC TREATMENT

Cornus kousa F. Buerger ex Hance., J. Linn. Soc., Bot. 13: 105 1873. *Benthamia kousa* (F. Buerger ex Miq.) T. Nakai, Bot. Mag. Tokyo 23: 40. 1909.

Deciduous trees, 4-11 m high. Bark brown or blackish gray, fissured, rough. Branches spreading, old ones greyish brown, nearly glabrous, young ones with short stiff appressed hairs; leaflets approximate at the ends of the branches. Petioles 1.4-1.8 cm long, black when dried, glabrous. Leaves simple, opposite, narrowly elliptic to oblong-lanceolate, 5.6-8.8 × 3.1-5.2 cm, acute to rounded at base, abruptly acuminate at apex, thinly leathery, coriaceous, dark green above, powder green beneath, entire along the margin; midrib grooved above, raised below; lateral nerves 3, 4 or 5, curved inward, extending upward, lower ones not reaching the apex of the margin; petiolules 0.6-1.1 cm long, glabrous. Inflorescence formed in the current year, 4 decussate scale-like bracts covering the inflorescence; cymes globose, 0.7-1.1 cm in diam., terminal, 20-35 flowered; bracts white, occasionally slightly pink, narrow to broadly elliptic, 3.2-4.7 cm long, glabrous, caducous after anthesis, outer pair of bracts larger than inner ones. Flowers closely packed, with conspicuous involucre of 4. Sepals with a ring of white trichomes, pubescent on both surfaces. Petals white to slightly yellow. Anthers yellow. Style cylindrical, densely hairy. Drupes uniting into a fleshy strawberry like head, globose, 1-2.5 cm in diam., slightly greenish white when young, becomes red when matured, with a hard 1-seeded stone; peduncle 1.8-7 cm long.

Infraspecific determination: The species *C. kousa* has two sub species viz., *kousa* and *chinensis*. The collected specimen had thinly papery leaves, abaxial surface of the leaf was light green, and branches were smooth with lines of elongate lenticels. These characters were similar to the subspecies *kousa*. However, in subsp. *chinensis* (i.e. *Cornus kousa* subsp. *chinensis* (Osborn) Q. Y. Xiang), the leaves are thickly papery with the abaxial surface powder green with curly white trichomes, and the branches with dense lenticels (Xiang and Boufford, 2005).

Vernacular name: Ramkattar, Bandarey geñrra (Nepali).

Phenology: Flowering, April-July; Fruiting, October onwards.

Habitat characteristics/specificity: Forests and shrubberies, moist hillsides and evergreen mixed forests.

Edapho-climatic range: Relative humidity: 65-95 %, Soil pH: 3.62-5.72, Carbon: 3.10-5.54 %, Phosphorus: 22.60-30.80 µg/g, Potassium: 12.45-39.12 µg/g.

Elevation range in KBR: 1200-2500 m asl.

Associated species: This tree species grows along with *Gnetum montanum* Markgr., *Erythrina*

Table 2. Population data of *Cornus kousa* subsp. *kousa* used for classification of threatened category under IUCN, version 8.0.

A. Population reduction	A4. >30% decline per generation	a. Direct observation: Few occurrences
		b. Average density per m^2: 4 individuals
		c. Quality of habitat: Fragmented, pastoralism
		d. Exploitation: Extraction of fruits, timber and fodder
B. Geographic range	B2. Area of occupancy (< 10 km^2)	a. Known to exist at no more than 10 locations
		b. Continuing decline
		(iv) Number of locations or subpopulations: < than 10 locations

arborescens Roxb., *Acer thomsonii* Miq., *Viburnum erubescens* Wall., *Cyclobalanopsis lamellosa* (Sm.) Oerst., *Juglans regia* L., and associated herb species include *Paris polyphylla* Sm., *Pleione praecox* (Sm.) D. Don, *Cardiocrinum giganteum* (Wall.) Makino, grasses and some fern species.

Global distribution hitherto described: Japan and Republic of South Korea.

SPECIES ACCOUNTS

Previous record from Asia excluding India: (http:/tropicos.org- *Silvestri 1865 (collection No. 1683)*; *Wilson 1873 (collection No. 223)*; *von Rosthorn 1900 (collection No. 1677*).

New record locality from India: Present record (Acronym and Accession No. *NEHU- 11898*, 7th July, 2008, from West district, near Chinjam Khola in KBR (2245 m asl), Sikkim, India, (N27°21'.528 & E88°07'.033).

THREAT STATUS

IUCN 2010 Version 8.0 has been followed to evaluate the threat status of the species in KBR (Version 8.0). Out of the five criteria, only two have been used to determine the threat status of the species. Two criteria used are: A. Declining population (past, present and /or projected). B. Geographic range size, and fragmentation, decline or fluctuations.

Considering these two criteria, the species may be classified as "Vulnerable" (A4abcd; B2ab (iv)) (Table 2).

The new record of the species from India extended the geographic distribution of *Cornus kousa* in Asia. With this report, the distribution of the subspecies *kousa* is also extended from Japan and Korea to India. The habitat of the species is being increasingly exposed to disturbance as it falls in the buffer zone of KBR. The human disturbance due to cattle grazing, firewood extraction and lopping of trees for fodder is the major cause of habitat destruction of the species. In view of these disturbances to its habitat, the species might deteriorate in its threat status. Therefore, future research on *Cornus kousa* should focus on identifying the reasons for its restricted distribution and efforts must be made to multiply its numbers to increase its population size.

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印度的新記錄種，東瀛四照花（山茱萸科）

Arun Chettri[1,2], S. K. Barik[1*], Bikarma Singh[1], D. Adhikari[1] and M. K. Lyngdoh[1]

1. Centre for Advanced studies in Botany, North-Eastern Hill University, Shillong 793022, Meghalaya, India.
2. Department of Plantation Management and Studies, School of Sustainable Development and Livelihood Management, Sikkim University, Tadong-737102, India.
* 通信作者。*Email: sarojkbarik@yahoo.com*

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摘要：我們陳述印度東喜馬拉雅的新紀錄東瀛四照花(*Cornus kousa* F. Buerger ex Hance subsp. *kousa*)（山茱萸科）。這個新紀錄延伸了 *C. kousa* 的地理分佈，自中國、大韓民國和日本擴大到印度東喜馬拉雅生物群落；由於這個報告，將其亞種 subspeices *kousa* 的分佈從日本和韓國擴大到印度。這物種於東喜馬拉雅的錫金 Khangchendzonga 生物圈保護區（27°06' – 28°05'N，88°02' – 88°47'E）被發現；這個發現修正了 *C. kousa* 現今在世界上的分佈。

關鍵詞：山茱萸，山茱萸科，印度，新紀錄，威脅狀況。