NOMENCLATURE

Where does *Juglans regia* L. (Juglandaceae) grow in Sikkim and Darjeeling Himalaya? *Juglans sigillata* Dode needs attention!

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Abstract

The occurrence of *Juglans regia* L. and *Juglans sigillata* Dode of the family Juglandaceae in Sikkim and Darjeeling areas of the Eastern Himalaya is revisited. Taxonomy of both the species is presented for future reference.

Key words: ICN, *Juglans regia*, *Juglans sigillata*, Sustainable development.

INTRODUCTION

The purpose of learning botanical nomenclature is to ascertain application of correct names to known plants and to facilitate unambiguous international communication on plant taxa. The standardization and legislation of nomenclatural rules set by the Code of the International Botanical Congresses (presently by the International Code of Nomenclature (ICN) for Algae, Fungi and Plants (Turland *et al.* 2019)) have been governing the determination of correct names. Thus, the correct botanical names act as a ‘Unique Object Identifier’ to which all information related to the name of a plant is permanently attached. Correct scientific names often indicate genetic relationships, plant characters, and nativity, and hence, the names have biological significance. Regardless of language barrier, plant data can be accessed across the global communities for different scientific disciplines so that a correct scientific name crashes all barriers to reach the target. When a wrong name is assigned to a taxon, the intended target is not achieved. However, the misidentification widely exists in Herbaria worldwide. For example, Goodwin *et al.* (2015) found there were at least 58% of the specimens had the wrong name in 4500 African ginger specimens. Although common (vernacular) names can serve as a source of scientific information, such as the origin of a name and eco-systematics or history of plant, they do not substitute for botanical names. It is because a plant may have few to many vernacular/local names, or in contrast one name may be used for more than one species with similar or almost similar uses, similar medicinal or nutritional values or even taste. For example, in Indian Himalayan region all *Juglans* are known under one common name ‘Akhrot’ or its derivations like ‘Akhroot’ or ‘Okhar’ in North Eastern states. Importantly, the success of any plant-related work largely depends on the correct identity of chosen species. Any research based on wrongly identified plants is not only a total loss of intellectuality, but also time-loss and monetary loss. Notably, instances are not rare wherein due to incorrect nomenclature, botanical research is of limited use.

All walnut members are highly valued non-timber forest produces and have considerable ecological and economic significance. The Himalayan members are important for their exceptionally high nutritional value and excellent quality timber. All parts of the tree are used in different medicinal purposes. Hence, in Sikkim and Darjeeling area walnut always remains one of the most favored tree species to the local inhabitants. In last two years, 2018 and 2019, rigorous field surveys were conducted across Darjeeling-Sikkim part the Eastern Himalaya to locate the populations of *Juglans* species in relation to study the diversity of the genus in this region. Simultaneously, to see the actual scenario we review current practice in use of name to brief under *Juglans* in this part of the Himalaya through extensive literature survey. In a quick search in Google Scholar over 5000 articles are traced in the name *Juglans regia* L. (attached with Sikkim/Darjeeling) in relation to various aspects of the species, like biodiversity, conservation, distribution, taxonomy, food, fodder, timber, economic botany, ethnobotany, cultivation, medicine, nutritional value, plantation, agrobiodiversity, agriculture, beekeeping, pollen and pollination, etc. All these publications unanimously used one single name, i.e. *J. regia*. Hooker (1888) while working on the family Juglandaceae of the then British India, recorded *J. regia* in Western Himalaya and mentioned its cultivation in Khasia hills. However, later, almost over the century, all publications related to the flora of Sikkim and Darjeeling had mentioned the name as *J. regia* and no other name of 'Okhar' plant is used and remain silent about the most dominant walnut species *Juglans sigillata* Dode in this region. Evidently, collection of *Juglans* specimens from Darjeeling, Sikkim and to some extent Arunachal Pradesh at different Indian herbaria including CAL and BSHC is not impressive. Many of the Eastern Himalayan specimens identified as *J. regia* are truly *Juglans sigillata*. Majority of researches on *Juglans* in NE India, including Sikkim, Darjeeling and Arunachal Pradesh is stained with such imperfect identification.

In the present investigation one of us (DM) and his research team located over 50 populations of *Juglans* in Darjeeling and Sikkim Himalaya. Each population is with 1 to 10 individuals. Significantly, all plants are critically identified as *Juglans sigillata*. Admittedly we failed to locate *J. regia* in Darjeeling and Sikkim. Maity *et al.* (2018) recorded one plant of *J. regia* at Yoksum region of West Sikkim under cultivation. However, the specimen is at very young stage and needs further confirmation.

Both, *Juglans regia* and *J. sigillata* are taxonomically well established species (Lu *et al.* 1999). Though they are different in several aspects, however, the most prominent morphological differences are lying on the leaf characters. In the former species leaflets are 5–9, whereas in the later leaflets are usually more than 11. In North Sikkim one individual-plant is recorded with leaves bearing upto 19 leaflets. Additionally, leaves are often 100 cm or more long in *J. sigillata*. Interestingly, in the present work the longest leaf recorded in this species is of 115 cm in North Sikkim. The texture of the leaflets is also distinct in both the species. In *J. regia* leaflets are chartaceous but in *J. sigillata* it is coriaceous, even to some extent rugose. Brief descriptions with most prominent and diagnostic characters of these two species are provided here along with field photographs to avoid confusion. A key to the species is also incorporated for easy recognition and correct identification.

Taxonomy:

***Juglans regia* L., Sp. Pl. 2: 997. 1753. [Plate I, H]**

Monoecious, deciduous, tall tree to 30 m high; leaves to 40 cm long; petioles to 7 cm long; leaflets usually 5–9, elliptic-ovate, oblong or narrowly elliptic, 5–15 × 3–7 cm, acute or shortly acuminate, entire or often serrulate, glabrous above, hairy on vein axils beneath; male catkins to 15 cm long; stamens 10–40; female flowers 1–3, ovary tomentellous; style plumose; nuts ellipsoid or subglobose, 4–6 cm in diameter, green.

PLATE - I. *Juglans sigillata* Dode: A. Habit (*inset*: left - male catkin; right - female flowers); B. Twig; C. One leaf (note number of leaflets); D. Fruit; E. Seed; F. L.s. of seed; G. T.s. of seed; H. Fruiting twig of *Juglans regia* L.

Flowers: April – May; *Fruits:* August - October

Altitudinal distribution: (500-)1700 – 2500 (-4000) m amsl

Distribution: India; E & C Asia; S Europe.

Juglans sigillata Dode, Bull. Soc. Dendrol. France 2: 94. 1906. [Plate I, A-G; Figure 1]

Monoecious, deciduous, handsome tall tree, to 35 m high; leaves to 115 cm long; petioles to 25 cm long; leaflets (9 -) 11 – 19, often subopposite, ovate-lanceolate, oblong, elliptic or lanceolate, 6 – 19 × 3 – 8 cm, entire, acuminate to long acuminate; male catkins to 20 cm long; stamens 24 – 27; female flowers 1 – 3, ovary tomentellous; style plumose; nuts obovoid to subglobose, often pear-shaped, 3.4 – 6 × 3 – 5 cm, green.

Flowers: March – April; *Fruits:* July – November

Distribution: India; China; Myanmar, Bhutan, Nepal. [1000 – 3000 m amsl].

Key to the studied species of *Juglans* L.:

- 1a. Leaves to 40 cm long; leaflets 5–9, chartaceous *J. regia*
- 1b. Leaves to 115 cm long; leaflets (9–) 11 – 19, strongly coriaceous *J. sigillata*

DISCUSSION

Present investigation, no doubt proves *J. sigillata* is the common species of walnut in Darjeeling and Sikkim Himalaya and population of *J. regia*, if exists, need to relocate and readdressed scientifically. Almost all publications related to walnut of this region actually based on *J. sigillata*. This communication is of paramount importance because proper identification is the basic need of scientific research, scientific exploitation and for sustainable development. It is worth mentioning that Pradheep and Soyimchiten (2016) highlighted similar finding in Nagaland and stated that ‘wild occurrence of *J. regia* is only westwards from Nepal, while in Eastern Himalaya and adjoining high hills (including Nagaland) *J. sigillata* replaces the former’ (p.681). Our finding is also a positive indication towards their conclusive remark.

In recent decades, species delimitation is well benefited by an integrative approach using morphological, molecular and environmental data together. For example, based on morphology, molecular phylogeography, DNA barcoding and species distribution modelling evidences, the species geographical and genetic boundary were well solved in taxonomy in tractable yew (*Taxus* L.) in the Himalaya region (Liu *et al.* 2013; Möller *et al.* 2013; Liu *et al.* 2018). Through our and Pradheep’s (2016) observation, we think such strategy should be urgently adopted in *Juglans* research in the near future.

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Figure 1. Distribution of *Juglans sigillata* Dode in India (highlighted)

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