

Extended distribution of the genus *Garcinia* L. in Sonitpur district, Assam, India

A. Kar¹, S. Borkataki² & S. K. Borthakur³

Department of Botany, Gauhati University, Guwahati-781014, Assam, India

¹The Energy and Resources Institute (TERI), Northeast Regional Centre, Chachal, VIP Express Highway,

Guwahati- 781036, Assam, India; *E-mail*: ashishvision10@rediffmail.com

²Department of Botany, Nowgong College, Nagaon-782001, Assam, India

³Corresponding author: *E-mail*: skbgu1@gmail.com

Abstract

The genus *Garcinia* L. (Clusiaceae), with its about 200 species, is distributed mostly in old world tropics. So far, 35 species of *Garcinia* has been reported from India. The present paper reports the extended distribution of eight species *Garcinia* along with their local uses from the Sonitpur district of Assam, India.

Key words: *Garcinia*, Distribution, Local uses, Sonitpur district, Assam.

INTRODUCTION

The generic name *Garcinia* commemorates Laurent Garcin (1683 – 1751), a French Botanist who worked in India, where the Genus is particularly diverse. The genus *Garcinia* L. (Clusiaceae), with its about 200 species is distributed in the Old World tropics, especially in Asia and Africa. Out of the 35 species found in India, 17 are endemic. Of these, 7 are endemic to the Western Ghats, 6 in the Andaman and Nicobar Islands and 4 in the Northeastern region. This evergreen genus is predominantly arboreal, rarely shrubby, with yellow or greenish gum resin with coriaceous lamina. Flowers polygamous, solitary-fascicled or paniced, axillary or terminal; sepals and petals 4 or 5 each, imbricate. Male flower with numerous free stamens; anthers 2 or rarely 4- celled. Female and Hermaphrodite flowers produce staminodes or with 8 – α stamens; ovaries 2-12- celled; stigma sessile; ovules 2 - 5 in each cell. Fruits pulpy when ripe; seeds often arillate (Anonymous 2007).

The present paper reports the extended distribution of 8 species of *Garcinia* L., viz., *G. xanthochymus* Hook.f., *G. cowa* Roxburgh, *G. sopsopia* (Buch.-Ham.) Mabberley, *G. lancaefolia* Roxburgh, *G. acuminata* Planchon & Triana, *G. pedunculata* Roxburgh, *G. gummi-gutta* (L.) N. Robson and *G. spicata* (Wt. & Arn.) Hook.f. in Sonitpur district of Assam in India.

Assam is the second largest state in Northeast India next to Arunachal Pradesh, lies between 24° 44' to 27° 45' N latitude and 89° 41' and 96° 02' E longitudes (Guha 2002), and covers an area of 78,438 sq km. The state is situated in sub-tropical monsoon zone and is one of the biodiversity hotspots that occupy a special place in northeast India (Baruwa 2006). The district of Sonitpur lies between 92° 16' to 93° 43' E longitude and 26° 30' and 27° 01' North latitudes, and covers an area of 5,324 sq km. The district is bounded by East and West Kameng district of Arunachal Pradesh on the North, North Lakhimpur district of Assam in the East, Udalguri district in the West and River Brahmaputra, Morigaon, Naogaon, Jorhat and Golaghat district in the South.

Sonitpur district is located between mighty Brahmaputra River and Himalayan foothills of Arunachal Pradesh. The district is largely plain with some isolated hills. A number of rivers

(Ziabharali, Gabharu, Borgang & Buroi) those originated in the Himalayan foothills flow southwards and ultimately drained in Brahmaputra River. The central and southern portion of the main plain is dotted with hills and hillocks, specially near the Brahmaputra River. In the extreme north of the region Bhalukpong, Seijusa, Pabhoi are with hills and hillocks marking the starting of the Himalayan foothills. Sonitpur district falls in the sub-tropical climatic region, and enjoys monsoon type of climate. Summer is hot and humid with an average temperature of 29°C. Winter extends from October to February, quite cold and is generally dry, with an average temperature of 16°C. It gets chilling in late December and early January, due to snowfall in the upper reaches of Arunachal Pradesh. Spring (March and April) is cool and pleasant. Summer rain is heavy, starts from late June and continued to early September by the moisture-laden South-West Monsoon. The diverse physiography helps the district to harbour rich biodiversity. Total forest cover of the district is 1420 sq km. The northern portion is made up of Forest Reserves and sparsely populated forest villages. The district abounds in biodiversity with evergreen and deciduous trees of diverse types. Nameri National Park and a few Wildlife Sanctuaries like Sonap-Rupai and Bor-Dikorai, and a number of Reserve Forests viz., Chariduar, Balipara, Goroimari are located in the district. These lush green forests are ideal habitat for different species of *Garcinia* in the district (Anonymous 2008).

METHODOLOGY

The field study was undertaken during the period 2002 – 2007. The specimens were collected from the natural vegetation and home gardens from various localities of Sonitpur district of Assam. Voucher specimens were processed following standard herbarium techniques (Jain & Rao 1977), matched in ASSAM, in the Herbarium of Botany Department, Gauhati University and in the laboratory using regional/state Floras of the region (Kanjilal *et al* 1940). Specimens were finally deposited in the Defense Research Laboratory (DRL) Herbarium, Tezpur. The name changes were checked with relevant literature including Bennet (1987).

RESULTS

Exploration of the Sonitpur district for *Garcinia* has resulted in documentation of eight species of *Garcinia* along with their local uses and are now enumerated below:

Garcinia xanthochymus Hook.f.; Local name: *Tepor tenga* [Plate I, Fig. 1]

Medium trees. Leaves 15 – 40 x 5 - 10 cm, oblong-lanceolate, coriaceous, shining on both surfaces, petiole thick, angled, fleshy, ligulate at base. Flowers pentamerous, dull white in 4-8 flowered fascicles from the axils of fallen leaves on fleshy pedicles. Male flowers: sepals 5, orbicular; petals 5, about twice the size of the sepals, orbicular; stamens in 5 fleshy bundles of 3-5, alternating with 5 fleshy gland; anthers 2-celled. Bisexual flowers: sepals as in the males; petals ciliate; stamen as in the males. Ovary usually 5-celled with a neck supporting 4-6 lobed spreading stigma. Fruits: 3 – 8 cm in diameter, pointed, crowned with persistent stigmatic lobes, turns yellow when ripe; seeds 2 – 4, oblong.

Local Distribution: Pothar chubori, Teleria, Pithakhuwa, Bihuguri, Goroimari, Rengunijhar, Chariduwar, Balijuri.

Fruiting season: April – August.

Local uses: Ripe fruits are roasted and made into chutney with mustard oil, salt and chilli; ripe fruits are made into thin slices, sun dried and used for seasoning curries with fish specially during summer.

Garcinia cowa Roxburgh; Local name: *Kau thekera* [Plate I, Fig. 2]

Medium trees. Leaves 5 – 12 x 3 – 5 cm, broadly elliptic-lanceolate, abruptly acuminate, red to reddish brown when young. Flowers dioecious, 4- merous, yellow; males in dense terminal or axillary clusters, sepals broadly ovate or suborbicular, pale yellow, unequal base, petals twice as long as sepals, oblong, brownish; anthers 4-gonous and 4- celled, pistillode minute; females larger than male, terminal, solitary or 3 – 5 together, shortly pedicelled, staminodes forming an interrupted ring consisting of 5 – 10 connate filaments round the ovary, stigmas with spreading 6-8 crenate lobes. Fruits about 5 cm in diameter, globose but slightly tapering and somewhat oblique towards the tip, crowned with persistent stigma, dull yellowish red outside and orange inside when ripe; seeds 4 – 8.

Local Distribution: Foothills, Seijusa, Daflagarh, Rongagarh, Teleria, Chariduwar, Balijuri.

Fruiting season: March- July.

Local uses: Aril of sweet sour ripe fruits is made into pickle; ripe fruits are sun dried and preserved with salt for future use; tender leaves are sour and used for seasoning curries.

Garcinia lanceaefolia Roxburgh; Local name: *Rupohi thekera* [Plate I, Fig. 3]

Middle sized tree. Leaves 10-16 x 1.5-3 cm, lanceolate, acuminate. Flower: red, terminal, solitary or 2-3 together, bracteate, unisexual. Petals 4, slightly oblique; stamens in 4 bundles of 4-5 each; anthers 4- celled; ovary obovoid ; stigma 6-8 -lobed. Fruit obovoid, about 3cm. diameter, bright orange red, crowned by the persistent stigma, 6-8 seeded.

Local Distribution: Potharchuburi, Dekergaon, Teleria, Charduar, Khonamukh, Bihuguri.

Fruiting season: June – August.

Local uses: Sun dried ripe fruits are preserved by adding salt for future use for seasoning curries.

Garcinia sopsopia (Buch.-Ham.) Mabblerley; Local name: *Sochopa thekera*

Evergreen big trees. Leaves 10 – 18 x 3 – 8 cm, ovate, elliptic or oblanceolate, acuminate, subcoriaceous. Male flowers dull white, sweet scented, sepals and petals 4 each, decussate, imbricate; stamen numerous on an elevated glandular receptacle. Female flowers larger, sessile or shortly stalked; ovaries oval; stigmas sessile, convex, entire, tubercled with minute glands. Fruits small, apple sized, globose or slightly elongate, red when ripe, crowned with hemispherical granular stigma; seeds 3 - 5 enclosed in pulpy aril.

Local Distribution: Located only in Mission Charali area; most probably planted.

Fruiting season: November – February.

Local uses: Arils sweet used for making refreshing drinks.

Garcinia pedunculata Roxburgh; Local name: *Bor thekera* [Plate I, Fig. 5]

Evergreen big trees. Leaves 12 – 24 x 6 – 10 cm, ovate or oblanceolate, rigid, subcoriaceous; midrib stout, base crenate. Male flowers pale green, few in terminal panicles and on stiff pedicels,

each with a pair of bracts a little above the base; sepals orbicular, fleshy; petals slightly larger than sepals but narrower; stamen numerous in a 4- cornered mass; anthers 2- celled, 4- angled. Female flowers solitary, larger than males, terminal on a thick 4- angled peduncle; staminodes many in 4- bundles (connate below); stigmas peltate, spreading, 10 -lobed. Fruits globose, 7 – 12 cm in diameter, fleshy; seeds 4 – 8, reniform, enclosed in fleshy aril.

Local Distribution: Do Parbotia Parbati Nagar, Bihuguri, Tumuki, Goroimari, Chariduwar, Bhalukpong, Rangapara, Chatia, Rengunijhar.

Fruiting season: April – August.

Local uses: Ripe fruits are made into thin slices, sun dried and used for seasoning curries and to treat dysentery.

Garcinia acuminata Planchon & Triana; Local name: *Kuji thekera* [Plate I, Fig. 7]

Small trees. Lamina 10 – 13 x 4 – 6 cm, elliptic to ovate–lanceolate, obtusely acuminate, coriaceous, base cuneate. Male flowers in groups of 3, shortly pedicelled, 6 cm across; sepals and petals orbicular, petals somewhat larger. Stamens 4-angled, fleshy; anthers orbicular, shortly stalked, flattened. Female flowers larger than males, solitary, subsessile, staminodes 12, filaments formig a ring round the ovary; ovaries globose; stigmas sessile, round or 4-lobed, tubercled. Fruits 15 cm in diameter, globose or slightly elongate, seated on persistent sepals and crowned with imperfectly 4-lobed stigma. Fruits become yellow when ripe; seeds 4.

Local Distribution: Bhumraguri, Napam, Teleria, Goroimari, Rengunijhar & Chariduwar.

Fruiting season: May – August.

Local uses: Aril is used for making refreshing drink; dry fruits used to treat blood dysentery.

Garcinia gummi-gutta (L.) N. Robson; Local name: *Kau thekera* [Plate I, Fig. 4]

Small trees. Lamina 12 – 15 x 3 – 5 cm, dark green, elliptic, shortly acuminate. Male flowers in short axillary fascicles; sepals narrow-membranous margined; petals oblong, concave; stamens 10 – 20 or more, adnate to receptacle into a mass with a prominent centre; rudimentary stigmas 3 - 4, very short or absent. Hermaphrodite flowers 1 – 3, terminal and axillary, larger than males; stamens 10 – 20, filaments unequal, all connate at base or in unequal bundles; stigmatic rays 8 – 10, tubercled, free nearly to base, spreading. Fruits equaling to the size of a plum, yellow when ripe, grooves 6 – 8, top flat, depressed, mamilla thick; aril succulent; seeds 4 – 6.

Local Distribution: Tumuki tniali, Pithakhuwa chubori, Bihuguri, Goroimari, Chariduwar and Borgang.

Fruiting season: June – August.

Local uses: Ripe fruit are used for making refreshing drinks; fruit are used for preparing pickle and also used for seasoning curries.

Garcinia spicata (Wight & Arnott) Hook.f.; Local name: *Kau thekera* [Plate I, Fig. 6]

Medium trees. Lamina 7 – 16 x 3 – 8 cm, glaucous, elliptic. Male and female flowers often mixed in one fascicle, but usually females remain fascicled and males in spike. Male sepals 4, orbicular, coriaceous, petals concave; stamens 10 – 20, filaments unequal, all connate at base or in unequal bundles. Females with longer pedicels than the males, staminodes 5, with broad anther; ovaries globose, 3 – 4 celled; styles very short. Fruits globose to oval, smooth, deep green, turns yellow when ripe, 2 – 4 seeded, aril juicy.



PLATE I: 1. *Garcinia xanthochymus* with fruits; 2. *G. cowa* with new leaves and fruits; 3. *G. lanceaefolia* with fruits; 4. Fruits of *G. gummi-gutta*; 5. *G. pedunculata* with fruits; 6. *G. spicata* with fruits; 7. Fruits of *G. acuminata*.

Local Distribution: Teleria, Balipara, Bhalukpong, Balijuri and Khonamukh.

Fruiting season: May – July.

Local uses: Juicy aril is used for making refreshing drink; ripe fruits are also used for making pickle.

DISCUSSION

After thorough scrutiny of literature (Hooker 1872; Kanjilal *et al* 1940; Joseph 1982; Balkrishna 1981; Long & Grierson 1984; Hajra *et al* 1996) it is revealed that out of the recorded eight species of *Garcinia* only three species were reported earlier (without specifying locality in the earlier works) and other five species viz., *G. acuminata*, *G. sopsopia*, *G. cowa*, *G. gummi-gutta* and *G. spicata* have not been reported from the Sonitpur district of Assam and hence the extended distribution of the eight species has been reported in the present investigation.

It is also interesting to note that fruits of all the eight species are edible and are sometimes marketed in different quantities. These are also used as medicine and for seasoning food items. Some species viz., *G. xanthochymus*, *G. pedunculata* and *G. acuminata* are sold in the local markets. Although *G. pedunculata* is precious for the Bihu ceremony but now-a-days it is difficult to get the fruits of this and other species due to loss of habitats caused by deforestation, monoculture, and other anthropogenic activities. Therefore, urgent attention is required to preserve these valuable species of *Garcinia*.

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LITERATURE CITED

- Anonymous, 2007. *Genus Garcinia*. Free Encyclopodeia. Pp.1-2. The Wikipedia publication, London.
- Anonymous, 2008. *Report of the Community Information Centre, Sonitpur district, Assam state*, P p.1-4. Government of Assam, Guwahati.
- Balakrishna NP. 1981. *Flora of Jowai and vicinity Meghalaya*. Vol.I, P p.87-89. Botanical Survey of India.
- Baruwa, A. 2006. Plant diversity of Assam, *Envis Assam*, 2: 1 – 8.
- Bennet SSR. 1987. *Name changes in Flowering plants of India and adjacent regions*. P p.249-250. Triseas Publishers, Dehradun.
- Guha, R. 2002. *New Assamese Atlas*. Asom Book Depo, Panbazar, Guwahati.
- Hajra PK, Verma DM & Giri GS. 1996. *Materials for the Flora of Arunachal Pradesh*, Vol.I, P p.182-186. Botanical Survey of India.
- Hooker, J.D. 1882. *The Flora of British India*. Vol-I, Pp259-270. L.Reeve and Co. 5, Henrietta Street, Covent Garden, London.
- Jain, S.K. & Rao, R.R. 1976. *A Hand Book of Field and Herbarium Methods*. Today's & Tomorrow's Printers and Publishers, New Delhi.
- Joseph, J. 1982. *Flora of Nongpoh and vicinity East Khasi Hills District*, Botanical Survey of India. Meghalaya, 41
- Kanjilal, U.N. 1940. *Flora of Assam*. Vol-I, Pp 103-110. R.Kumar and Sons Publications, T.7, Rajouri Garden, New Delhi.
- Long DG, Grierson AJC. 1984. *Flora of Bhutan* (including records of plants from Sikkim, Vol.I, Part II, P p.56-57. Royal Botanical garden, Edinburgh.