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Studies on morphology and ethnobotany of Six species of *Garcinia*L. (Clusiaceae) found in the Brahmaputra Valley, Assam, India

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ABSTRACT

The Brahmaputra valley is a tropical region of Assam lying in between $25^{0}44'N-28^{0}N$ latitude and $89^{0}41'E-96^{0}02'E$ longitude. The Brahmaputra valley is surrounded by hilly region except the west. In the north situated country Bhutan and state Arunachal Pradesh; in east state Arunachal Pradesh; in south Nagaland, Karbi Anglong autonomous hill district of Assam and state Meghalaya, west is bounded by state west Bengal. Total length of the valley is 722 Km and average width is 80 Km. The valley is endowed with rich biodiversity and natural resources. Members of the genus Garcinia L. known for their edible fruits, and medicinal properties. Garcinia L. commonly known as "Thekera" by Assamese people and have rich traditional uses in this region. The present paper is an attempt to evaluate comparative morphological characters and ethnobotany of six species of GarciniaL. sporadically distributed in Brahmaputra valley.

Key words: Garcinia, Morphology, Ethnobotany, Brahmaputra valley, Assam

INTRODUCTION

The Brahmaputra valley is a tropical region of Assam lying in between $25^{0}44'$ N- 28^{0} N latitude and $89^{0}41'$ E- $96^{0}02'$ E longitude. The Brahmaputra valley is surrounded by hilly region except the west. In the north situated country Bhutan and state Arunachal Pradesh; in east state Arunachal Pradesh; in south Nagaland, Karbi Anglong autonomous hill district of Assam and state Meghalaya, west is bounded by state west Bengal. Total length of the valley is 722 Km and average width is 80 km. The climate of the valley is humid mesothermal. The eastern part of the valley experiences high rainfall and low ranges of temperature. The present paper is an attempt to evaluate comparative morphological characters and ethnobotany of six species of *Garcinia*L. sporadically distributed in Brahmaputra valley.



Fig; Map of Assam

Garcinia L. belongs to the family Clusiaceae found throughout in the tropical region of the world. Members of the genus *Garinia* L. are evergreen trees or shrubs with greenish gum resins. Leaves subcoriaceous or leathery; stipules usually 0. Flowers solitary, fascicled, umbelled or panicled, polygamous or dioecious. Sepals 4-5, leathery persistent; petals 4- 5, imbricate. Fruits berry with fleshy rind enclosing 2-8 large pulpy seeds. The members of the genus *Garcinia* L. are potential, high value medicinal plants and have antimicrobial activity (Anonymous, 2002).

The genus has about 200 species native to South Asia ranging southern parts of the Thiland and Peninsular Malaysia to Indonesia, distributed in South East Asian region (Sharma *et al.*, 1993; Mabberley 2005; Stevens 2001). In peninsular Malaysa there are 49 *Garcinia* species out of 350 species estimated worldwide (Whitemore 1973; Stevens 2001). In India, 30 species reported by T. Anderson in Flora of British India (1874). Among the 35 species reported by Maheswhari (1964), 15 species are included in North-East India. Kanjilal *et al.*, (1934) reported 9 species from undivided Assam. Kar *et al.*, (2008) reported 8 species from Sonitpur districts of Assam.

A few species are cultivated either for fruits, vegetables, traditional medicines or other domestic uses such as for making house, firewood and landscaping. Among the cultivated species are included *Garcinia atroviridis*, *G. cowa*, *G. Morella*, *G. lanceaefolia*, *G. hombroniana*, *G. prainiana* and *G. mangostana*. Members of *Garcinia* L. species produced edible fruits and *G. magostana* is often considered as most famous fruit. Young leaves of the few members of *Garcinia* L. eaten cooked by some tribes in the N.E region (Arora 1981, Jain & Dam 1991, Rao *et al*, 1981). Hydroxy citric acid (HCA) is found in the fruits of certain members of *Garcinia*L., which including *G. cambogia*, *G. indica and G. atroviridis*. The latex of *G. cowa* is used in Thai folk medicines as an antifever agent (Pattalung *et al.*, 1994). Members of *Garcinia* L used after childbirth medication, for menstrual problems, dysentery and fever in traditional system of medicine (Burkill 1935) and also recorded that some species have potential treatment for HIV (Rukachaisirikul *et al.*, 2003) and Cancer (Nabandith *et al.*, 2004).

MATERIALS AND METHODS

The study was conducted during the periods of 2009-2010. The species were collected by extensive field survey both flowering and fruiting stage. Identification of collected specimens was verified by consulting different floras (Hooker, 1896; Kanjilal *et al*, 1934-1940). Voucher specimens were preserved in the form of herbarium as per standard field and herbarium technique (Jain & Rao 1977) and submitted at NEDFi R & D Centre for MAP, Khetri, Kamrup, Assam.

RESULTS

Table-1. Morphological characters and ethonobotany of six species of *Garcinia* L. sporadically distributed in the Brahmaputra valley, Assam are given in the tabular form

Particulars	Garcinia	Garcinia	Garcinia	Garcinia	Garcinia	Garcinia
	pedunculata	paniculata	Morella	cowa Roxb.	lanceaefolia	xanthochymus
	Roxb.	Roxb.	Desr.		Roxb.	Hook.
Legalmana	Don	Sahana	Vuii thalama	Van thalrows	Dunchi theliene	Tonon ton co
Local name	Bor-	Schopa-	Kuji-thekera	Kau-thekera	Ruponi-tnekera	Tepor-tenga
	$\operatorname{Drumang}(K)$	Marlo (K)	(ASS.)	(ASS.)	(ASS.)	(ASS.)
	Trunnang (IK.)	Mario (IX.)				
Distribution	North East	Assam,	Assam,	Assam and	Assam,	Lower altitude of
	India.	Meghalaya	Arunachal	Meghalaya.	Meghalaya and	N.E. India.
		and	Pradesh,		Nagaland.	
		Nagaland.	Meghalaya			
			and			
			Inagalallu			
Habit	An evergreen	A small	A small	An	A small	An evergreen
	tree, rather	evergreen	middle sized	evergreen	evergreen tree.	middle size tree.
	short spreading	tree.	evergreen	middle size		
	branches.		tree.	tree.		
Leaves	Leaves (13-	Leaves (11-	Leaves (10-	Leaves (7-	Leaves (4.5-	Leaves (25-
	30x 15-	15x4.5-6.5)	11x5-7) cm.	11x4-7) cm.	6x2.5-3.5) cm.	32x4-8) cm.
	21)c.m.,	cm. elliptic	elliptic to	broadly	lanceolate long	Narrowly oblong
	obovate or	or	ovate-	elliptical	acuminate.	or oblong
	rigid sub-	acuminate	obtusely	acuminate		coriaceous to
	coriaceous.	sub-	acuminate	in apex.		leathery shining
		coriaceous.	sub-	-		in both surfaces.
NC 1 .		NC 1 .	coriaceous.	NC 1 -	NC 1 .	NC 1 .
Midvein	Midvein stout	Midvein	Midvein	Midvein	Midvein	Midvein
	lateral vein	prominent.	lateral vein	lateral vein	lateral vein not	lateral vein
	distinct.	lateral vein	slightly	not	prominent.	distinct.
		distinct.	prominent.	prominent.	•	
Leaf petiole	Petiole long	Petiole long	Short (0.4-	Short (0.3-	Short (0.5-	Long (1.5-1.8x1-
size	(1.5-2.5x1.2-	(2.2-	1x0.4-0.8)	0.6x0.6-0.8)	1x0.3-0.5) cm.	1.5) cm. in size.
	1.3) cm. in	2.8x1.1-1.4)	cm. in size.	cm. in size.	in size.	
	size.	cm. in size.				
Pedicels size	Pedicels long	Pedicels	Short	Short	Pedicels short	Pedicels short
	and thickened	short (0.4-	pedicels	pedicels	(0.4-0.5x0.5-	and thickened.
	(3-5x4-4.5)	0.6x1-1.2)			0.8) cm. in	
	cm. in size.	cm. in size.			size.	
Flowers	Flowers	Flowers	Flowers	Flowers	Flowers	Flowers
	polygamous, 4-	polygamous	polygamous,	polygamous	polygamous, 4-	polygamous,

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	merous; male flowers large pale green, stamens many.	, 4-merous, male flower white sepals and petals 4 each, stamens numerous.	tetramerous; male flowers generally together, in axils of fallen leaves, hermaphrodi te flowers solitary.	, 4-merous. Flowers borne on the axils of the fallen leaves. Male flowers in dense terminal or axillary clusters, hermaphrod ite flowers.	merous. Male flowers 1-2 terminal; sepals thick, petals smaller, stamens many. Hermaphrodite flowers terminal of axillary.	pentamerous; male flowers borne on the axils of the fallen leaves. Sepals -5, petals-5, stamens -5. Stigma oblique.
Fruits	Fruits large, yellow in colour when ripe. Mature fruits (7- 8.2x25-29.8) cm. in size. Fresh wt. of the mature fruits av. 500 gms.	Fruits small (3-41x12- 15) cm in size, cherry, yellow, succulent with granular stigma.	Fruits 1.5-2 cm. in diameter globose or slightly elongated, yellow when in ripe.	Fruits size small orange like 4-5 cm. in diameter globose but slightly tapering and somewhat oblique towards to the apex, dull red outside and orange inside when ripe.	Fruits small ovovoid about 2 cm. in diameter, orange-yellow in colour.	Fruits 3.5-6 cm. in diameter, sub- globose, pointed, golden yellow in colour when ripe.
Seeds	Seeds 4-8 per fruits, enclosed in a fleshy or succulent aril.	Seeds generally 4, enclosed in a pulpy aril.	Seeds 4, testa dark brown.	Seeds 4-8.	Seeds 6-8.	Seeds 2-6.
Flowering time	Throughout the year.	December- February.	February- March.	March- April.	February- March.	March-May.
Fruiting time.	January-April.	March- April.	April-June.	June- August.	June-July.	October- February.
Status	CE	CR	CR	CR	CR	CR
Ethnobotany	The fruits are acidic and	The ripe fruits are	The fruits are eaten raw	The fruits are edible,	The fruits are acidic and	The fruits are acidic and

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edible,	eaten and	or dried,	persevered	eaten raw or	edible. The ripe
preserved after	very	good for	after sun-	dried, good for	fruits used for
sundried (Fig-	delicious.	dysentery. A	dried slices	dysentery; the	making jams,
2) for local	Leaves are	commercial	in	gum resin is	delicious
consumption.	used to	source of	Assamese	called	chutney in
The old dried	treated	'gamboge'	household.	'gamboge' is	Assamese
fruits are good	round-	occurs as a	The fruits	used as	household. A
for dysentery,	worm.	yellowish	and leaves	medicine and	sherbet made
digestive and	Wood is	colour; oil	used in	as yellow dye;	from ripens and
cooling. The	moderately	and juice of	dysentery,	oil and juice of	dried fruits are
fruits are also	hard used	fruits are	diarrhea.	fruits are	given in
used as fixative	for house	cooling for	Young	cooling for	dysentery. Bark
or as a mordant	building,	fever,	leaves are	fever, jaundice	of the tree and
for saffron dye.	firewood	diabetes and	eaten by	and urinary	latex of unripe
Wood is hard	(Dutta	jaundice.	hilly people	troubles.	fruits are used to
has potential	1985).	-	of Assam.		make yellow
value used for	,		Fruits are		dye. Woods is
making house,			also used in		hard, good for
wooden			headache.		making house.
furniture and					-
traditional rice					
mill "Dheki"					
preparation.					

Avriviations: Ass.-Assamese, K.-Karbi, CE-Critically Endangered, CR-Critically Rare.

DISCUSSION AND CONCLUSION

The members of *Garcinia* flourish well in evergreen or semi evergreen forests but some thrive in areas with relatively low rainfall (Sharma *et al.*, 1993). Members of the genus *Garcinia*L. known for their edible fruits, and medicinal properties. *Garcinia*L. commonly known as "*Thekera*" by Assamese people and have rich traditional uses in this region. In spite of having ample economic potential the species of the genus *Garcinia* occurring in Assam and also in N.E. India has not been studied properly. A good number of publications has appeared in the last few decades within and outside the country on *Garcinia*. However, there are no publications with consolidated information on taxonomy and distribution of *Garcinia* appeared so far for N.E. India in general and Assam in particular. As such the taxonomy and distribution of the species of the genus occurring in Assam still remain unattended. From the literature review it is evident that the genus *Garcinia* L. needs a thorough study on taxonomy and distribution in N.E. India in general and Assam in particular.



I. Garcinia pedunculata Roxb. : An evergreen tree with fruiting stage.



II.G. pedunculata Roxb.: A mature fruit, sun-dried slices for preservation.



III.G. pedunculata Roxb. : (a) Seeds with fleshy pulp (b) After removing the pulp.



IV. G. lanceaefolia Roxb.



G. cowaRoxb.

V. G. paniculata Roxb.





G. pedunculata Roxb.1-year old seedling.

G. xanthochymus Hook.





VI. Different stages of *G. morella* Desr. (a) An evergreen middle size tree (b)Naturally grown seedlings of *G. morella*.(c) Epigeal germination.



VII. G. pedunculata used in traditional Assamese festival Bohag Bihu

REFERENCES

[1] Anonymous, The wealth of India (Raw materials), First Supplement Series, Vol. V, NISCOM-CSIR Publication, New Delhi **2002**.

[2] R K Arora, Native food plants of the north-eastern tribals, In S.K.Jain (ed.) Glimpes of Indian Ethnobotany, Oxford & IBH Publication New Delhi **1981**, 91-106.

[3] I H Burkill, A Dictionary of the Economic Product of the Malay Peninsula 1. Reprint Edition (1966). Kuala Lumpur, Ministry of Agriculture and Co-Operatives **1935**.

[4]AC Dutta, Dictionary of economic and medicinal plants. Published by S.L. Dutta, Khelmati, Jorhat 1985.

[5] J D Hooker, The flora of British India. Published by Bisen Singh Mahindra Pal Singh Dehradun **1874**. Vol.-I, 259-270.

[6] BD Sharma; M. Sanjappa (Ed.); NP Balakrishnan; *Flora of India*. Botanical Survey of India, Calcutta **1993**. **3**:pp. 98-131.

[7] SK Jain; R R Rao. A hand book of Field and Herbarium Tachnique. 1977

[8]SK Jain, Dictionary of Indian folk medicine and ethnobotany, Deep publication, New Delhi 1991.

[9]SK Jain & N Dam, Some ethnobotanical notes from north-eastern India. 1979. Econ. Bot. 33: 52-56.

[10] UN Kanjilal; PC Kanjilal; A Das. Flora of Assam. V-I. Published Periodical Expart Book Agency. Delhi. **1934**-1940, 103-110.

[11]A Kar; S Borkakoti; SK Borthakur, Extended distribution of the genus *Garcinia* L. in Sonitpur district, Assam, India. **2008**. *Pleione*. **2**(2): 165-170.

[12] DJ Mabberley, The plant Book-A Portable dictionary of the vascular plants (2nd ED) Published Cambridge University Press. **2005**, 293.

[13] JK Maheswari, Taxonomic Studies on Indian Guttiferae III. The genus *Garcinia* Linn. **1964**. *Bull bot surv India* **6**(2-4): 107-135.

[14]V Nabandith; M Suzui, T Morioka; T Kaneshiro; T Kinjo; K Matsumoto; Y Akao; M Iinuma ; N Yoshimi, Inhibitory effects of crude alpha-mangostin, a xanthone derivative, on two different categories of colon preneoplastic lesions induced by 1, 2-dimethylhydrazine in the rat. **2004**. *Asian Pacific Journal of Cancer Prevention* 5(4):433-438.

[15] PN Pattalung; W Thongtheeraparp; P Wiriyachitra; and WC Taylor, Xanthones of *Garcinia cowa*. *Planta medica* **1994**, 60(4), 365-365.

[16] MK Rao; R Shanpru...Some plants in the life of the Garos of Meghalaya, In S.K. Jain (ed.) *Glimpes of Indian Ethnobotany*, Oxford & IBH Publication New Delhi. **1981**, 153-160.

[17]V Rukachaisirikul; P Pailee; A Hiranrat; P Tuchinda; C Yoosook; J Kasisit; WC Taylor; V Reutrakul, Anti-HIV-1 protostane triterpenes and digeranylbenzophenone from trunk, bark and stems of *Garcinia speciosa*, *Planta Medica* **2003**, 69(12): 1141-1146.

[18] B D Sharma; M Sanjappa; NP Balakrishnan, Flora of India. Botanical Survey of India, Calcutta. 1993, 3:98-131.

[19]PF Stevens, Angiosperm phylogeny Website. Version 6. http:// <u>www.mobot.org/MOBOT/</u> research/APweb/, May **2006**.

[20]TC Whitemore; Guttiferae. In T C Whitemore(ed.) Tree Flora of Malaya, Kuala Lumpur, Longman Malaysia. **1973**. 2, 162-236.