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Distribution and traditional uses of *Thunbergia* Retzius (Acanthaceae) in Assam, India

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Abstract

The paper highlighted the distribution and traditional uses of *Thunbergia* Retzius in Assam. Total five species have been recorded from different localities of Assam. Traditional uses of these five species as medicinal, ornamental, vegetable, cultural significance and as other uses have also been highlighted in the enumeration section of the paper.

Key words*: Thunbergia*, Distribution, Traditional uses, Assam

INTRODUCTION

Thunbergia named in 1780 by Retzius, in the honours of Carl Peter Thunberg (1743-1828), a Swedish botanist, doctor and naturalist. Thunberg was a pupil of Linnaeus and he has been called "the father of South African botany" and the "Japanese Linnaeus" for his great contribution in botanical research for these two nations. Most of the species of Thunbergia are known as clock vine that is for its clockwise twinning habit (Retief & Reyneke 1984). Thunbergia contains 100 species and distributed in tropical region of Asia and Africa (Borga *et al* 2005; Deng *et al* 2011).

The genus *Thunbergia* Retzius [Acanthaceae] is taxonomically characterized by its shrubby or herbaceous habit; twining or scandent stem; simple, opposite, leaves; axillary, solitary or terminal or extra-axillary racemes; variously coloured corolla, 4-stamens, didynamous; anthers bithecous; ovary fleshy, globose, bilocular, style long, stout, stigma bifid ; capsule globose, or ovoid, didymous, with an ensiform beak (Anonymous 2011).Genus is differing from other member of the family with their reduced calyx and enlarged bracteoles (Borga *et al* 2005).

Assam has an area of 78,433 sq km, representing 2.39 % of the total area of India. The state lies between 24°44´ N to 27°45´N latitude and 89°41´ and 96°02´ E longitudes (Guha 2011). Favourable geographical location, diversified topography and ideal climatic conditions have made Assam very rich in biodiversity. The vegetation of Assam is primarily of tropical type covering areas of evergreen, semi-evergreen, grasslands, deciduous forests, grasslands and riverside forests (Anonymous 2012). Assam is the third richest state in term of number of flowering plants (3895 flowering plant species) next to Arunachal Pradesh and Sikkim among the northeastern states (Hegde 2000).

Hooker (1885) recorded 10 species of *Thunbergia* from India viz., *Thunbergia fragrans, T. tomentosa, T. alata, T. hawtayneana, T. lutea, T. grandiflora, T. laurifolia, T. coccinea, T. mysorensis, T. wightiana* and same numbers of species were also recorded by Santapau & Henry in 1973. For Assam, Kanjilal *et al* (1939) recorded *Thunbergia coccinea* and *T. grandiflora*; Nath (2010) recorded *T. grandiflora*; Dutta (1985) and Sarmah (2002) recorded *Thunbergia coccinea* and *T. grandiflora*; Bora & Kumar (2010) recorded *T. fragrans* and *T. grandiflora* from Pabitora Wild life Sanctuary; Begum *et al* (2011) recorded 02 species from Nameri National Park. Kar *et al* (2012) recorded *T. grandiflora* from Nilachal hills. Very limited literature is available on *Thunbergia* of Assam and no attempt has been taken so far to explore the other species of *Thunbergia* from Assam.

Uses of *Thunbergia* species especially on *Thunbergia grandiflora* and *Thunbergia coccinea* were mentioned in few publications. Teron (2005) reported the use of *Thunbergia grandiflora* in worship to nullify the evil influences and is considered as a sacred plant by the Karbis. He also reported this plant is used to cure minor eye sore and against snake bite. Sarma (2006) reported the use of root of *Thunbergia coccinea* against dysentery, stomach pain and fever; *T. grandiflora* leaves against stomach ailment and root against toothache and bone fracture. Patiri & Bora (2007) reported the uses of leaves of *Thunbergia grandiflora* as vegetable. Nath & Dutta Choudhury (2010) reported the uses of *Thunbergia grandiflora* stem juice against conjunctivitis by the Hmar tribe of Cahcar district. Borah *et al* (2012) recorded the use of leaf paste of *Thunbergia grandiflora* with hen's egg, which is taken orally against gastritis. However, studies on the distribution of *Thunbergia* species particularly in Assam are scanty. Moreover, reports on traditional uses of *Thunbergia* species are limited only on *Thunbergia grandiflora* and on *Thunbergia coccinea*. Therefore, the present study aims to document the distribution and traditional uses of different species of *Thunbergia* in Assam.

MATERIALS AND METHODS

Extensive field surveys, collection and documentation were made in Assam during the years 2011 – 2013 to record the distribution of *Thunbergia* species in state and their traditional uses. Documentation on the uses of different species was made with the help of local people through discussions and consultations. Collected specimens were processed into mounted herbarium sheets following Jain & Rao (1977). The specimens were identified in the laboratory using available literature including Kanjilal *et al* (1938), Hooker (1885) and were matched at the Gauhati University Herbarium. The specimens were deposited at TERI, Northeastern Regional Centre, Guwahati for future reference. For authors' full names in citation Das *et al* (2012) has been followed.

RESULTS

During field studies undertaken in different districts of Assam, 5 species were recorded, namely *Thunbergia alata* Bojer *ex* Sims, *Thunbergia coccinia* Wallich *ex* D. Don, *Thunbergia erecta* (Bentham) T. Anderson, *Thunbergia fragrans* Roxburgh, *Thunbergia grandiflora* (Roxburgh *ex* Rottler) Roxburgh. Recorded species are enumerated below along with their synonym(s), common name, local names, brief description, distribution, flowering & fruiting time, traditional uses and reference to the voucher specimen. Photographs of the collected species have been shown in the figure from 1 to 12.

Key to *Thunbergia* species in Assam

1. Erect shrub; petiole short, circular; flowers purple blue to dark blue; anthers with a spur at the base .... *T. erecta*

1a. Plant climbers 2

2. Petioles winged; corolla orange or yellow with dark purple throat internally .....*T. alata*

2a.Petioles not winged; corolla other than orange or yellow …… 3

3. Flowers red in long pendulous racemes; capsule glabrous …… *T. coccinea*

3a. Flowers white or bluish white …… .....……. 4

4. Flowers solitary, axillary; corolla completely white; fruits glabrous …. *T. fragrans*

4a. Flowers in drooping racemes; corolla white/ bluish-white/ blue; fruits puberulous ….. .... *T. grandiflora*

Thunbergia alata W. Bojer *ex* Sims, Bot. Mag. 52: t. 2591. 1825. Sims, J., Curtis's Bot. Mag. 52: t. 25. 1825.

Synonyms: *Thunbergia albiflora* (Hooker) Gordon; *Thunbergia aurantiaca* Paxton; *Thunbergia backeri* R. deVilmorin; *Thunbergia doddsii* Paxton; *Thunbergia fryeri* R. deVilmorin; *Thunbergia manganjensis* T. Anderson *ex* Lindau; *Thunbergia reticulata* Hochstetter *ex* C.G.D. Nees; *Endomelas alata* (W. Bojer *ex* Sims) C.S. Rafinesque (Wunderlin & Hansen 2008)

Common name: Black-eyed Susan vine; **Local name:** *Kola saku lota* (Assamese)

Herbaceous climber; stem quadrangular to flattened, pubescent ; petioles winged; lamina sagittate to deltoid ovate 2 – 11 x 1 – 7 cm, entire to undulate, cordate-hastate basally, pubescent; inflorescence solitary dichasia in leaf axils, pedunculate; bracteoles green, ovate, , 1.1 – 1.6 x 1 – 1.5 cm, pubescent ; calyx annular, unequally 10 – 13 lobed; corolla orange or yellow with dark purplish black or dark maroon glandular eye in throat, 2.5 – 4.8 cm mm long, limb subactinomorphic, lobes obovate to obdeltate, truncate; anthers with basal appendage; capsules pubescent, enveloped in two large persistent bracts, 2 – 4 seeded; seeds about 4 – 5 mm in diameter.

Flowering: October – March; **Fruiting**: February – May

Distribution: Gardens and wasteland in all the districts of Assam

Traditional uses: Planted in the garden as an ornamental species for its attractive orange flower with dark purple throat.

Exsiccatae: Chachal, Kamrup Metropolitan, *A. Kar 11*, dated 22.03.2012

Note: *Thunbergia alata* is native to Eastern Africa (Kenya, Tanzania and Uganda).

Thunbergia coccinea Wallich *ex* D. Don, Prod. Fl. Nap. 120. 1825. Hooker in Bot. Mag. 85. t. 5124. 1859; Bailey, Man. Cult. A. rev. ed. 919. 1949; Parker, For. Fl. Punj. 3rd. ed. 389. 1956;T. Anderson, J. Linn. Soc. Bot. 9: 448.1868; Clarke in Hooker *f.*, Fl. Br. Ind. 4: 394.1885; Trimen, Handb. Fl. Ceylon 3: 289. 1895, in obs.; Bremekamp, Verb. Kon. Ned. Akad. Wetensch. Afd. Natuurk., Tweede Sect. 50(4): 43. 1955. Type: India, Assam, Griffith 1055 (BM).

Synonym(s): *Hexacentris coccinea* (Wallich *ex* D. Don) C.G.D. Nees (IPNI 2005)

Common name: Scarlet Clock Vine; **Local name**: *Chonga lota* (Assamese)

Woody climbers; stems subglabrous, pubescent at nodes; petiole 1.5 – 7 cm, grooved; lamina broadly ovate, 6.5 – 16 x 4 – 12 cm, sinuate or dentate and lobed in the basal half, acuminate, rounded to cordate at base, pubescent, palmately 3 – 5-veined; racemes axillary or terminal; bracts lanceolate, abaxially pubescent, adaxially glabrous; bracteoles oblong, 2.1 – 2.6 x 1 – 1.5 cm.; flowers scarlet-red with orange-yellow centre, 2.5 – 3 cm long; calyx 1.5 – 2 mm, reduced to a minute rim; corolla red; tube basally cylindric for 5 – 6 mm, throat 1.5 – 1.6 cm; lobes sub-orbicular, 5 – 7 mm in diameter; filaments 1.2 – 1.5 cm, glabrous, tuft of trichomes at base; anther thecae parallel, unequal with longer one 5.5 mm and shorter one 4.5 mm, spurred at base; ovary glabrous; style glabrous, exerted; stigma 2-cleft; capsule glabrous, basal part 1 – 1.2 x 1.5 – 2 cm, beak 1.5 – 2.5 cm long, puberlous; seeds compressed.

Flowering: November – March; **Fruiting**: February – April

Distribution: Gardens in all the districts of Assam

Traditional uses: Planted in the garden as an ornamental species for its attractive drooping red inflorescence. Fresh root extract are used as health tonic and as aphrodisiac.

Exsiccatae: Chachal, Kamrup Metropolitan, *A. Kar 10*, dated 18.02.2012

Note: *Thunbergia coccinea* is native to India, Myanmar and Malaysia. One taboo prevails in Assam about this plant that if people sits below this plant they will suffer from back ache and allergy problems.

Thunbergia erecta (Bentham) T. Anderson in J. Proc. Linn. Soc. Bot. 7: 18. 1863. Bor & Raizada, Beaut. Ind. Climb. & Shrubs 107. pl. 38. 1954; Lanewala & H.M. Nasir, Dec. Fl. Kar. 65. 1982.

Synonym(s): *Meyenia erecta* Bentham (GRIN 2006)

Common name: Bush Clock Vine, King's Mantle; **Local name:** *Nil Kantha* (Assamese)

Shrub, glabrous, upright, 1 – 1.50 m heigh; lamina obovate or ovate to elliptic, 3 – 8 x 2 – 4 cm, serrate, acute, apiculate, base rounded; flowers purple, blue or dark blue, 5 – 6 cm long, and 3 – 4 cm across, solitary, axillary; bracts 15 x 10 mm, deciduous; calyx teeth subulate, glandular hairy; corolla tube curved yellowish-white or white, glandular hairy outside, lobes subequal, 1.5 cm long, obtuse; staminal filaments glandular-hairy; anthers oblong, 4 mm long, mucronate; style 3 – 3.5 cm long; stigma 2-lobed.

Flowering: November – March; **Fruiting**: February – April

Distribution: Gardens in all the districts of Assam

Traditional uses: Planted in the garden for ornamental purpose for its attractive purple colour flower. Roots are used against psychiatric patient in traditional medicine

Exsiccatae: Chachal, Kamrup Metropolitan, *A. Kar 19*, dated 27.03.2013

Note: *Thunbergia erecta* is native to West Africa (Nigeria, Ghana, Mali, Niger & Burkina Faso)

Thunbergia fragrans Roxburgh, in Lodd. Bot. Cab.t. 323. 1819. Pl. Coromand. 1: 47. t. 67. 1795. Fl. Ind. ed. 2.3: 33. 1832; Nees in Wallich, Pl. Asiat. Rar. 3:77. 1832; Clarke in Hooker *f.*; Cooke, Fl. Pres. Bomb. 2: 417. 1906; Bamber, Pl. Punj. 585. 1916; Bor & Raizada, Beaut. Ind. Climb. Shrubs 105. 1954; Stewart in Nasir & All, Ann. Cat. Vasc. Pl. W. Pak. & Kashmir 679. 1972.

Synonym(s):*Thunbergia volubilis* Persoon; *Flemingia grandiflora* Roxburg ex Rottler; *Thunbergia bodinieri* H. Leveille; *T. fragrans* subsp. *hainanensis* (C. Y. Wu & H. S. Lo) H. P. Tsui; *T. hainanensis* C.Y. Wu & H.S. Lo (GRIN 2006)

Common name: Sweet Clock-Vine, White Lady; **Local name:** *Lota kothona* (Assamese)

Climber; stems angular or flattened; leaves opposite, lamina lanceolate-ovate or triangular ovate, 7.5 – 8.5 x 3.2 – 4.5 cm, dentate, acute, base cuneate or obtuse to subcordate, 4 – 7-nerved, petioles 0.8 – 4.2 cm; flowers axillary, solitary, peduncles 1.2 – 5.5cm long; bracts 2, ovate; calyx unequal, 10 – 16 dentate; corolla white, 2.5 – 5.2cm, long velutinous tube 5-lobed; stamens didynamous; filaments slender, 5 – 8 mm long; anthers basifixed, 2.5 – 3 mm long; style filiform, 1.2 – 2.4cm long; stigmas funnel shaped, 1.8 – 2 mm; capsules glabrous, subglobose, basal part 5.5 – 6 x 8 – 15 mm, beak 1.2 – 2.1 cm; seeds subglobose, 3.5 – 5.2mm in diameter.

Flowering: Mar – November; **Fruiting**: July – November

Distribution: Recorded in the canopy of dense forest. Distribution is very rare and natural population was located only in few pockets of Sonitpur, Nagaon and Dibrugarh district forest areas

Traditional uses: Planted in the gardens for decorative plants for its attractive white coloured flower

Exsiccatae: Biswanath Charali, Sonitpur, *A. Kar 27,* dated 21.05.2013

Note: *Thunbergia fragrans* is native to India and Sri Lanka. There has been lots of confusion on why the species name is fragrans. Dr. Roxburgh, who gave the name to this flower, says in his book, *Plants of the Coast of Coromandel:* "the plant possesses a peculiar and agreeable fragrance, and the beauty of its flowers, although not fragrant, entitles it to a place in the flower-garden; so, the plant possesses a fragrance, but not the flowers" (Retief & Reyneke 1984).

Thunbergia grandiflora (Roxburgh *ex* Rottler) Roxburgh in Bot. Reg. 6. t. 495. 1820. Sims in Bot. Mag. 50. t. 2366. 1822; Roxburgh, Fl. Ind. 2nd. ed. 3: 34. 1832; Nees in Wallich, Pl. Asiat. Rar. 3:77. 1832; Wight, Icon. Pl. Ind. Orient. t. 872. 1844-1845; Parker, For. Fl. Punj. 3rd. ed. 389. 1956. J. Bellenden Ker, Bot. Reg. 6: t. 495. 1820

Synonym(s): *Thunbergia adenophora* W.W. Smith; *T. chinensis* Merrill; *T. lacei* Gamble; *Flemingia grandiflora* Roxburgh *ex* Rottler; *Thunbergia cordifolia* Nees

(Biology on line 2012)

Common name: Bengal Clock Vine, Bengal Trumpet Vine, Blue Sky Flower, Blue Sky Vine, Blue Trumpet Vine ; **Local name**: *Hati loti, Kukua loti* (Assamese).

Woody climber; stem quadrangular, pubescent; petiole grooved, pubescent 1 – 6.5 cm long ; lamina ovate 8 – 15 x 4 – 12 cm, pubescent, sinuate or coarsely toothed in the lower half, acute to acuminate; Inflorescence axillary or terminal drooping racemes; flowers whitish blue or violet with yellow centre, 6 – 8 cm long, 6 cm across, pedicellate; bracts free or connate, ovate-oblong, 3 – 3.5 cm x 1.5 – 2 cm, acute-acuminate; calyx truncate, velvety-rimmed, purplish; corolla glabrous, tube 3 – 4.5 cm long, obtuse; stamens inserted at the throat, filaments flattened, anthers oblong, bithecous, basally appendaged ; stigma with 2 subequal lobes; ovary glabrous; capsule globular, 1.2 – 1.5 cm, pubescent, basal part 1.4 – 1.8 cm in diameter, beak 2 – 2.5 cm. Seeds ovate, compressed, verrucose.

Flowering: Throughout the year; **Fruiting**: Throughout the year

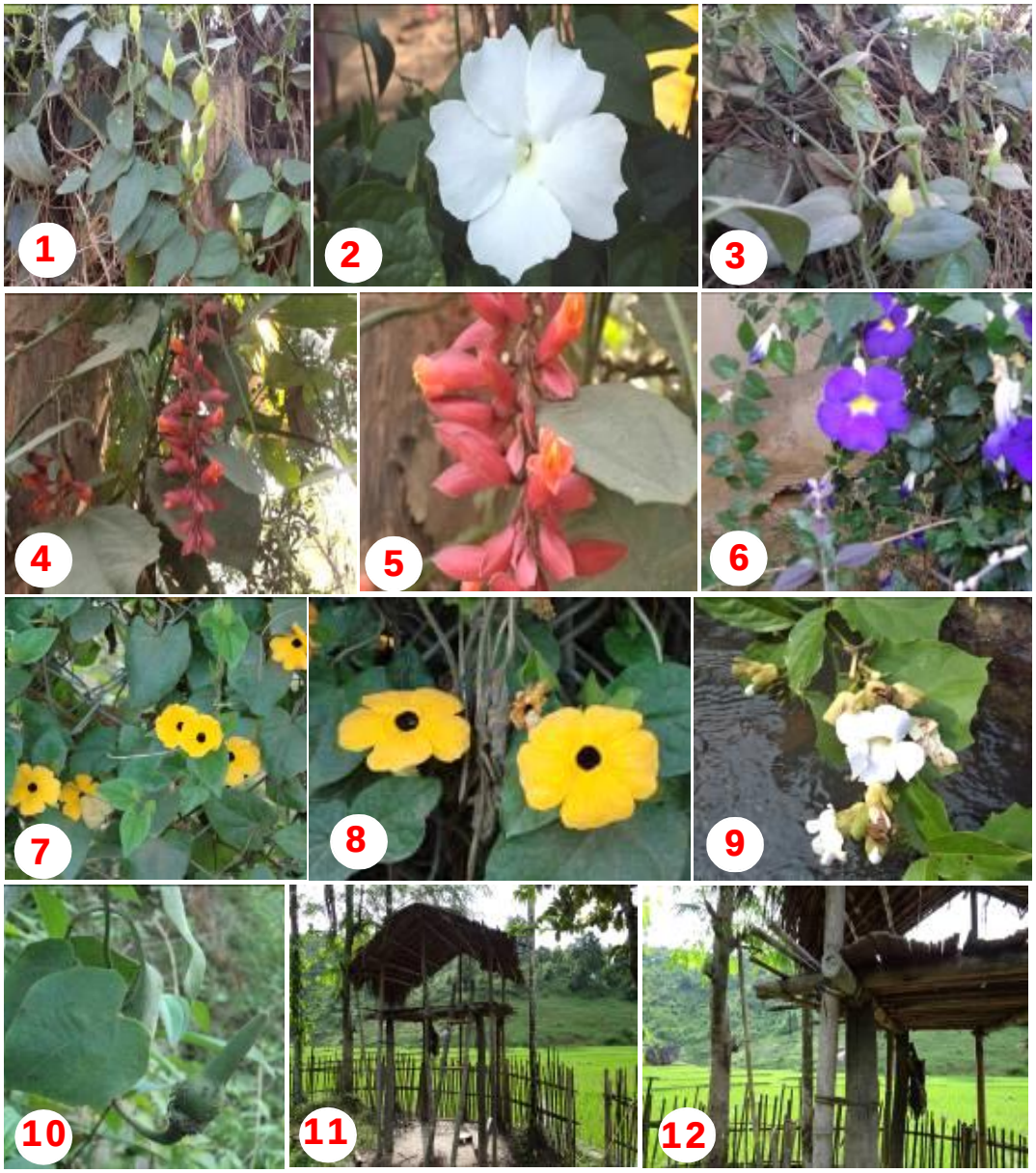

PLATE – I: Species of *Thunbergia* Retzius recorded from Assam. Fig. 1. Flower bud of *T. fragrans;* **Fig. 2.** A flower of *T. fragrans;* **Fig. 3.** Fruit of *T. fragrans;* **Fig. 4.** Habit of *T. coccinea;* **Fig. 5.** Flower bud and flower of *T. coccinea;* **Fig. 6.** Flower bud and flower of *T. erecta;* **Fig. 7.** Habit of *T. alata;* **Fig. 8.** Flower of *T. alata;* **Fig. 9.** Flower of *T. grandiflora;* **Fig. 10.** Fruit of *T. grandiflora;* **Fig. 11 & 12.** Stem of *T. grandiflora* used as substitute of rope for the construction of farm house.

Distribution: Scrub jungles and forests. All the districts of Assam, very common in Karbi Anglong, Dima Hasao, Cachar, Udalguri, Baska and Chirang districts.

Traditional uses: Flowers are used as vegetable; leaves are used to prepare traditional dishes in festive occasion with rice powder, alkali and meat by the Karbi tribe. Leaf decoction is used in diarrhea and stomach disorder in Assam. Stem is used as substitute of rope for miscellaneous works. Root decoction used as health tonic.

Exsiccatae: Khetri, Kamrup, *A. Kar 31,* dated 13.06.2013

Note: The species is native to India and Myanmar

DISCUSSION

From the survey result it may be concluded that flower of five species represent with different colour. Distribution of *Thunbergia fragrans* is restricted in some pockets in natural habitat and *Thunbergia grandiflora* is found in all the districts of Assam and *Thunbergia coccinea* commonly planted in the garden in all the districts. As *Thunbergia fragrans* is very rare and to increase its population plantation in the gardens need to be undertaken. Out of five species all the species are used as ornamental species, one species as vegetable, three species as medicine and one species has cultural significance. Root, leaf, stem and flower parts of *Thunbergia grandiflora* are used for different purposes. Detailed floriculture study will help to understand its utility as ornamental plants for nursery business as well as aesthetic value. The medicinal values recorded in these plants were based on traditional knowledge of the communities and some of the practical uses by the communities and hence there is a scope for scientific evaluation of these species for betterment of the human society.

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LITERATURE CITED

Anonymous, 2011.Genus: *Thunbergia* Retz. *Germplasm Resources Information Network*. United States Department of Agriculture. 2007-10-05. Retrieved 2010-10-30.

Anonymous 2011 Genus Thunbergia, *Fl. China* 19: 377- 379

Anonymous, 2012. *ENVIS Centre: Assam, Plant Diversity*. Assam Science Technology and Environment Council, Guwahati, Assam.

Begum, S.S.; Roy, H.; Nath, M. & Borthakur, S.K. 2011. A sketch of the flora of Nameri National Park, Assam:II. Phytogeography. *Pleione* 5(1): 10 – 22.

Biology On Line 2012. *Flemingia grandiflora* Roxburgh ex Rottler, Integrated Taxonomic Information System, on line database, http://www.itis.gov

Bora, P.J. & Kumar, Y. 2010. *Floristic diversity of Assam: Study of Pabitora wildlife Sanctuary*. Daya Publishing House, New Delhi.

Borah, S. M.; Borah, L. & Nath, S.C. 2012. Ethnomedicinal Plants From Disoi Valley Reserve Forest of Jorhat District, Assam. *Pl. Sci. Feed* 2(4): 59 – 63.

Borga, A.J.; Dadeb, L.M. & Schonenbergera, J, 2005. Molecular systematics and patterns of morphological evolution in Thunbergioideae (Acanthaceae), *Journal of Stockholm University*, 3:1-1

Das, A.P.; Paul, T.K. & Ghosh, C. 2012. *Authors of Botanical Names*, East Himalayan Society for Spermatophyte Taxonomy, North Bengal University, Siliguri

Deng, Y. Hu, J.Q. Daniel, T.F. Wood, J. & Wood, J.R.I. 2011. Flora of China, Thunbergia Retzius, 19: 377- 379, WWW. E-floras.org

Dutta, A.C. 1985. *Dictionary of economic and medicinal plants*. Published by SL Dutta, Jorhat.

Guha, R. 2011. *New Assamese Atlas*. Asom Book Depo, Panbazar, Guwahati.

Germplasm Resources Information Network (GRIN) 2006. Taxon: *Meyenia erecta*, (Online Database), National Germplasm Resources Laboratory, USDA, Beltsville, Maryland

Germplasm Resources Information Network (GRIN) 2006. Taxon: *Thunbergia frgrans* Roxburgh, (Online Database), National Germplasm Resources Laboratory, USDA, Beltsville, Maryland

Hegde, S.N. 2000. Conservation of Northeast Flora, *Arunachal Forest News*, 18(1&2): 5 – 26.

Hooker, J.D. 1885. *Flora of British India*, Vol-IV, L Reeve & Co Ltd, Kent, London.

International Plant Names Index 2005, Acanthaceae- *Hexacentris coccinea*, Kew

Jain, S.K. & Rao, R.R. 1977. *A Hand Book of Field and Herbarium Technique*. Today & Tomorrow's Publication, New Delhi.

Kanjilal, U.N.; Das, A; Kanjilal, P.C. &. De RN 1939. *Flora of Assam*. Vol. III. Govt Press, Shillong, India.

Kar, A.; Goswami, N.K. & Saharia, D. 2012. Diversity of Angiosperms in Nilachal hills (Kamakhya hills) in Kamrup district of Assam and their uses, *Pleione* 6(2): 304 – 321.

Nath, K.K. 2010. *A Database of Medicinal Plants of Assam* (*Thunbergia grandiflora*), Assam Plants.com, Mangaldoi.

Nath, M. & Dutta Choudhury, M, 2010. Ethno-Medico botanical aspects of Hmar tribe of Cachar district, Assam (Part I), *Indian J.Trad. Knowl.*, 9(4): 760 – 764.

Patiri, B. & Bora, A, 2007. Wild edible plants of Assam, Director Forest Communication

Retief, E. & Reyneke, W.F. 1984. The genus *Thunbergia* in southern Africa, *Bothalia* 15: 107 – 116.

Santapau, H. & Henry, A.N. 1973. *A dictionary of the flowering plants in India*. NISCOM-CSIR, New Delhi.

Sarma, J, 2006. *Medicinal and aromatic plants of Assam with special reference to Karbi Anglong*, Published by Silviculture Division, Department of Forest, Diphu.

Sarmah, B. 2002. *Udbhid Gyankosh*, Banimandir Publication, Guwahati

Teron, R. 2005. Bottle gourd: part and parcel of Karbi culture, *Indian J.Trad.Knowl.*, 4(1): 86 – 90.

Wunderlin, R.P. & Hansen, B. F. 2008. *Atlas of Florida Vascular Plants*, Institute for Systematic Botany, University of South Florida, Tampa.