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Botanical Identity and Utilitarian Aspects of the 'Best Quality Tejpat' from Northeast India

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ABSTRACT

Cinnamomum impressinervium Meissn., a taxon identified/discovered from Northeast India, as the 'best quality tezpat spice' has been overviewed, for its botanical/morphological identity along with their utilitarian aspects like essential oil characters of leaves, uses and propagation technology, for easy reference.

Key words: *Cinnamomum impressinervium*, botany, essential oil, uses, propagation, Northeast India.

INTRODUCTION

Tezpat or Indian cassia is a kind of leafy spice obtained from an evergreen, aromatic tree species *i.e*. *Cinnamomum tamala* Nees & Ebrem, occurring in tropical and sub-tropical Himalayas, including Northeast India. The leaf of this species is used as the genuine source of 'tejpat spice of commerce'. It is popular among the people of northern India and since antiquity ++has been used as a flavouring agent which is inevitable in the preparations of vegetarian and non-vegetarian dishes. This leafy spice is however, been obtained from a number of other tree species belonging to the genus *Cinnamomum* Schaeffer (Baruah 2011, 2016).

While conducting an ethnofloristic survey on the aromatic, spice and medicinal plants in Northeast India, we came across a very interesting and promising species of the genus *Cinnamomum* Schaeffer (Family: Lauraceae) and identified the same as *C. impressinervium* Meissn (Baruah 2000, Baruah *et.al.* 2000). This very particular species is known by the local people of Dima Hasao district of Assam as 'Best Quality Tejpat' (**Figure 1A** & **1B**) and even sold its leaves in the local markets by the same name (Baruah and Nath 2001).

The authenticity of utilizing the leaf as 'Best Quality Tejpat' has been reported by analyzing the essential oil compositions which is very rich in eugenol (Nath and Sarma Baruah 1994, Nath *et.al.* 1999). The percentage composition of eugenol in the leaf oil of *C. impressinervium* (Nath and Sarma Baruah 1994, Nath *et. al.* 1999) is reported to be higher (up-to 88.30%) than that of the leaf oil (up-to 82.50%) of *C. tamala* Nees. (Atal and Kapur 1982, Nath *et.al.*1999).

The market survey on the essential oil of *C. impressinervium* reported that, this particular oil can be used as a substitute of 'Clove leaf oil' (Nath 1998).

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A **B**

Figure 1A & B. *Cinnamomum impressinervium* – A. Fresh leafy twig, and B. Dry leaves (Best Quality Tejpat)

A. BOTANICAL IDENTITY

Cinnamomum impressinervium Meissn. in DC Prodr. 15(1): 25.1864; Hk.f. Brit. Ind. 5:129. 1885; *C. cacharensis* R. N. Parkar ? Kanjilal *et al.* Fl. Assam 4:58. 1940. (Figure 3A). Baruah & Nath. J.Econ.Tax.Bot. 29(2): 294-327. 2005.

A middle-sized evergreen tree; 20-25ft tall, branchlets teret and slender; Bark rough, aromatic, brown, inside creamish-brown, on exposure turning brown, 6-10mm thick; Leaf buds silky; Leaves alternate, sub-opposite or opposite on the same twig, coriaceous, aromatic, smell like "tejpat" leaves, glabrous, shining above, dark green, pale below, elliptic-oblong to elliptic-lanceolate, apex acute to acuminate, base decurrently acute, variable in size, 2.5-3.8 x 7-14cm, triplinerved, lateral nerves reaching near the base of the acumen, suprabasal perfect to imperfect, midrib stout, 2^0 nerves sub-horizontal, nervules not so distinct; Epidermal cells pentagonal to polygonal and highly sinuous, hypostomatic, stomata sunken, stomata/ mm^2 550, stomatal index 19.52, Areoles tetragonal to polygonal, vein endings simple, average frequency of areole/mm^2 7.88; Petiole stout, slightly concave above, 0.8-1.1cm long; Panicle sub-terminal to axillary, shorter than leaves, up-to 6.5cm long, glabrate, perianth 3+3, sub-equal, minutely puberolous on truncate cup-shaped fruiting tepals, pedicel obconic, pedicel with fruiting tepal up-to 8mm long.
(**Figure 2).**
Phenology: Flrs. February - April, Frts. May - August.

Ecology & distribution: Found growing in both wild and homestead gardens of Dima Hasao and Cachar districts of Assam at an elevation between 800-1050m.

B. UTILITARIAN ASPECTS

B1. Leaf essential oils characters

The yield and physico-chemical characters of leaf oil of *C. impressinervium* (cultivated one) as reported are given below –

Oil yield (FWB) = 2%
Colour = Yellowish-brown
Odour = like Tejpat leaves/ Clove leaf oil
Taste = Spicy, pungent
Refractive Index (25^0C) = 1.5320
Optical Rotation (25^0C) = $+16^0$
Density (25^0C) = 1.0350

GC analyses of leaf oils from cultivated and wild plants of *C. impressinervium* as reported (Nath and Sarma Baruah 1994, Nath *et.al.* 1999) revealed the presence of 10 components each accounting 97%-96.8% of the total oil where **eugenol** alone constitutes 83.2% to 88.3%. Other components of above 1% concentration of the oil are d-3-carene (1.6%-7.2%), limonene (2.3%-4.1%), eugenyl acetate (1%-1.1%), etc. The chemical compositions of the leaf oils are presented in **Table 1.**

Figure 2. A Fruiting twig of *Cinnamomum impressinervium* (Line diagram by Author)

Table 1. Composition of the leaf essential oil of *Cinnamomum impressinervium*

Components	**Peak area (%)**	
	Cultivated plant	**Wild plant**
α-pinene	0.5	1.2
β-pinene	0.1	0.2
d-3-carene	1.6	7.2
Limonene	4.1	2.3
p-cymene	0.6	0.7
guaiacol	0.1	0.4
α –terpineol	0.3	0.4
Eugenol	88.3	83.2
b-caryophyllene	0.1	0.2
Eugenyl acetate	1.1	1.0
Total	96.8	97.0

Source: Nath and Sarma Baruah 1994, Nath *et.al.* 1999

B2. Uses

C. impressinervium is considered as the 'best quality tejpat tree' and its leaves are sold in the local markets as the 'best quality tejpat'.

Smoke of dry leaf is used to inhale for curing cold, cough and toothache.

Decoction of leaves is sometimes used as a stimulant and for the treatment of colic, diabetes, diarrhea and rheumatic pains (Baruah & Nath 2006).

B3. Propagation technology

B3a. Seed propagation of *C. impressinervium*: *C. impressinervium* is naturally propagated by means of seeds. Scientific research work on this promising spice crop with regards to using seed has been carried out by Saikia & Nath (2003). The fresh and mature seeds of this species depulped using luke-warm water and treated with 500 ppm solution of GA3 showed highest percentage of germination (92.5). The seeds indicated a dormancy period up-to 6 weeks even when the nursery beds were provided with proper shading and regular watering. With the increase of storage period, the seeds started losing their viability.

The percentage germination of the seeds as recorded by Saikia & Nath (2003) showed that the seeds of depulated conditions exhibited germination earlier with better result in comparison to the seeds of normal (pulped) condition. However, the depulped seeds treated with luke-warm and cold water at 500ppm of GA_3 showed maximum percentages of germination (92.5 and 70.0 respectively) than that of their normal conditions (47.5%)

It is also recorded (Saikia & Nath 2003) that the seeds sown at one week of drying and storage period from the date of their collection give maximum germination in both normal (92%) and depulped (80%) conditions. The rate of germinations however, gradually decline with the increase of drying and storage periods. Germination is checked completely at 7 weeks of drying and storage condition

The results thus, clearly indicate that *C. impressinervium* seeds when sown under fresh condition show germination even up to 11^{th} week from the date of their sowing, although optimum germination was recorded (92.5%) in the seeds of depulped category when they were treated with luke-ware water at 500ppm of GA_3. The rate of the germination was found to be comparatively slower up-to period of 3^{rd} and 4^{th} week in depulped and pulped conditions which were thereafter became speedy within the period of 4^{th} to 11^{th} and 5^{th} to 11^{th} weeks respectively. It was however, found to be checked completely after 11^{th} week. The seeds of *C. impressinervium* thus indicate a range of dormancy period from 2 to 11 weeks in a nursery bed condition as recorded in the present experiments. However, the seeds loss their viability when they are allowed to dry and store for a period of 7 weeks under room condition at a temperature of 26-36°C and relative humidity 86-97% although a minimum percentage of germination (4%) is recorded for the seeds of 42 days drying and storage

The acceleration of germination process of seeds treated with GA_3 could be attributed to the fact that the GA_3 induces mobilization of stored reserve for metabolism or enzyme activity in the embryo results the quicker germination as reported previously for the species like *C. zelyanicum* (Sebastain *et.al*. 1995) and *C. camphora* (Bahuguna *et.al*. 1987). However, the delay and inhibition of seed germination in *C. impressinervium* may be due to their aromatic pulps which act as inhibitor, as indicated previously in the species like *C. camphora* (Bahuguna *et.al.* 1987) and *Litsea cubeba* (Baruah & Nath 1998).

B3b. Vegetative propagation of *C. impressinervium*: Vegetative propagation of *C. impressinervium* Meissn was studied by Baruah (2009, 2011). The cuttings (current year lateral shoots)

of the species exhibited 100% rooting at 90 days intervals. The regeneration techniques developed in the study provided a good deal of protocol, for multiplication of this new and promising species of *Cinnamomum* used as tejpat (best quality tejpat) through stem cuttings.

Baruah (2009), the author of the present communication followed the following experimental procedures for propagation and multiplication trial of *C. impressinervium*, using stem cuttings.

The stem cuttings were obtained from the plants grown in the Experimental Botanic Garden **(Figure 3)** of CSIR-NEIST (formerly known as RRL), Jorhat, Assam. The plantlets of the population of the said garden were collected by the present author (then CSIR Research Fellow) along-with his Ph. D. guide Dr. S. C. Nath (Retired Senior-most Scientist of the said institute) during the middle of the last decade of the 20th century from a homestead garden of Haflong area of Dema-Hasao Distrcit of Assam, and accordingly planted under their supervisions. The stem cuttings used in the experiment were differed from the conventional one, and these were alike with those used by Nath and Baruah (2000). Comparatively healthy 3-5 months old lateral shoots/cuttings possessing 2-5 moderate sized leaves and swollen bases were selected, from their mother plants. These were detached gently with the help of fingers, from the axis of their main branches. The sizes of the cuttings were ranges from 5.5cm to 11cm.

Figure 3. Plantation of 'Best Quality Tezpat' at CSIR-NEIST, Jorhat

The experiments were conducted during October' 2006, inside of the 'Green Shade House' of P.G. Department of Botany, Darrang College, and subsequent period are considered for the study of, rooting response of the cuttings. The rooting medium like loamy soil with equal proportion of sandy soil is used. The sandy soil used was collected from 'Jahajghat' bank of the mighty river Brahmaputra near Tezpur, Assam of Northeast India.

The selected cuttings are planted at 12 x 12cm spacing in raised nursery beds of the above rooting medium in 3 replications (25 Nos. of cuttings in each replication). The mulching provided for the nursery beds has been done by covering with 4-6cm thick layering of dry grasses cut into small pieces and shocked in water for about 36-48 hours. The cuttings are planted in the nursery bed or rooting medium by making them 40^0-60^0 angle to the rooting surface and 3-5cm depth of the rooting medium. During the period of experimentation, the atmospheric temperature ranged from 14 to 27^0C and likewise, soil temperature ranged from 11 to 18^0C. Care was taken to provide sufficient exposure to the foliar parts of the cuttings. Necessary shading and watering arrangements was also made to maintain a constant temperature and moisture at the nursery beds.

The rooting response of the cuttings were observed from 30^{th} day onwards from the date of their plantation at an intervals of 30 days up-to 90 days, and the data on callusing and rooting percentages along with the number and length of the roots were recorded taking into account the average of 12 randomly selected cuttings, taken out from the beds for **(Figure 4)** each data.

The data on rooting response of *C. impressinervium* cuttings as reported (Baruah 2009) were presented in **Table 2**. *C. impressinervium* cuttings exhibited 41.67% callusing at 30 days intervals and 66.67% rooting at 60 days intervals, where the lengths of primary (1^0) roots were 3.32cm. The cuttings of *C. impressinervium* exhibited 100% callusing and rooting at 60 and 90 days intervals, respectively. Likewise, at an interval of 90 days, the cuttings exhibited 9.13cm long primary (1^0) roots, and at an interval of 90 days, the length of secondary (2^0) and tertiary (3^0) roots were recorded as 2.53cm and 0.43, respectively.

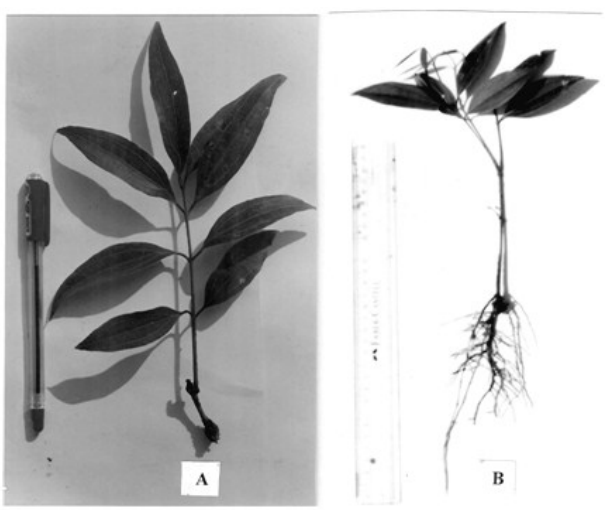

Figure 4. Rooted cuttings of *Cinnamomum impressinervium* (Scale = 30cm) – A. Root callusing, B. Eight months old.

Table 2. Rooting response of the lateral shoots of *C. impressinervium*

Rooting response	Observation intervals after		
	30 days	**60 days**	**90 days**
Callusing (%)	41.67	100	--
Rooting (%)	--	66.67	100
Average No. of 1^0 roots	--	2.67	3.58
Average length of 1^0 ro (cm)	--	3.32	9.13
Average No. of 2^0 roots	--	5.27	11.25
Average length of 2^0 root (cm)	--	0.62	2.53

Vegetative propagation of *C. pauciflorum* using stem cuttings of lateral shoots with swollen bases was carried out (Nath and Baruah 2000). In *C. pauciflorum*, 100% rooting as well as cent percent survival was recorded. The study on the vegetative propagation of *C. impressinervium* exhibited 100% rooting too.

REFERENCES

Atal C.K. and Kapur B.M. 1982. Cultivation and Utilization of Aromatic Plants. RRL Jammu-Tawi Publication. India.

Bahuguna V.K., Rawat M.S. and Thapa V.S. 1987. Preliminary investigation on dormancy and germination behaviour of *Cinnamomum camphora* Nees. seeds. Van Gagyan. 25(1&2): 35-37.

Baruah A. 2000. *Cinnamomum* species associated with the livelihood of people in North-East India: A systematic census with emphasis to ethnobotany. Ph. D. Thesis. Gauhati University. Assam.

Baruah A. 2009. Vegetative propagation of two species of *Cinnamomum* Schaeffer. Medicinal Plants. 1(2): 121-123.

Baruah A. 2011. *Tejpat – the Indian Bay Leaves*. Lambert Academic Publishing, Germany.

Baruah A. 2016. Taxonomic Diversity and Utilitarian Aspects of Tejpat Spice. North-east J. Contemporary Rsearch. 3(1): 1-6.

Baruah A. and Nath S. C. 2006. Ethnobotanical evaluation of *Cinnamomum* Schaeffer species used as spices and condiments in Northeast India. *Ethnobotany*. 18 (1&2): 27-35.

Baruah A. and Nath S. C. 2001. Best Quality Tejpat – *Cinnamomum impressinervium* Meissn. *Spice India*. 14(5): 5-7.

Baruah A. and Nath S.C. 1998. Germination studies on the seeds of *Litsea cubeba* Pers.- A promising essential oil crop of industrial value. Indian Perfumer. 1998. 42(2): 86 – 91.

Baruah A., Nath S.C. and Boissya C.L. 2000. Systematics and diversities of *Cinnamomum* species used as "Tejpat" in Northeastern India. *J. Econ. Tax. Bot*. 24(2): 361-374.

Nath S.C. 1998. Summary of the completed project on "Commercial resources of *Cinnamomum* species in Eastern Himalayan region of India: Survey, Identification and Conservation for sustainable use" *In* ENVIS Bulletin - Himalayan Ecology and Development. 6: 21 -22.

Nath S.C. and Baruah A. 2000. An effective method for vegetative propagation of two Cinnamon sources. *In* Conserva-

tion of Biodiversity Edts. V.P. Agarwal and S.K. Gupta, Society of Biosciences Publications, Muzaffarnagar. India. Pp. 147-154.

Nath S.C. and Sarma Baruah A.K. 1994. Eugenol as the major component of the leaf oil of *Cinnamomum impressinervium* Meissn. J. Essent. Oil Res. 6: 211-212.

Nath S.C., Baruah A. and Hazarika A.K. 1999. Essential oils of the leaves of *Cinnamomum* Schaeffer members. Indian Perfumer. 43(4): 182-190.

Saikia N. and Nath S.C. 2003. Germination studies on the seeds of *Cinnamomum impressinervium* Meissn. Indian Perfumer. 47: 73-77.

Sebastain S., Farooqi A.A. and Subbaiah T. 1995. Effect of growth regulators on germination and seedling growth of Cinnamon (*Cinnamomumzeylanicum* Breyn). Indian Perfumer. 39(3): 127-130.