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Distribution of Rare and Noteworthy Zingibers in Mudumalai Tiger Reserve

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Abstract

Zingiberaceae are perennial rhizomatous herbs with their centre of distribution in the Indo- Malayan region. Their phenology is depended on precipitation, which starts with the first shower and ends in hibernation after flowering and fruiting. As they grow on inaccessible slopes inside the forest they often go unnoticed. This study was an effort to identify and document the noteworthy members of family Zingiberaceae existing in Mudumalai Tiger Reserve. All the species reported here are recorded for the first time from Mudumalai Tiger Reserve.

Keywords: Mudumalai Tiger reserve, Zingiberaceae, Zingiber.

Introduction

Mudumalai Tiger Reserve, a part of Nilgiri Biosphere Reserve (NBR) (5,520 km2) is blessed with rich diversity of vegetation primarily due to the different forest types it is constituted of. Champion and Seth[1] classified the vegetation type in Mudumalai as Southern Tropical dry thorn forest (6A/C), Southern Tropical dry deciduous forest (5A/C1B and /C3), Southern Tropical moist deciduous forest (3B/C1C and C2) ,Southern Tropical semi evergreen (2A/C2, Moist Bamboo brakes (2E3) , Moist Bamboo brakes (2E3), Riparian forest (4E/RS1). These forest thus harbour enough plant diversity to ensure a healthy herbivore population essential to maintain its high Tiger density. Situated between 11^0 32' and $11^0$43' N and $76^0$22' and $76^0$45' E. in the tri -junction of Tamil Nadu, Karnataka and Kerala, it is enclosed within the Wayanad wildlife Sanctuary on the north west, Bandipur Tiger Reserve on the north, the Singara and Sigur Reserved Forests of Nilgiri North Division on the south and east., thus offering a habitat contiguity of about 3300 km2 including Nagarahole Tiger reserve Through the forest corridors between the Western Ghats and Eastern Ghats including the protected areas of Nagarhole tiger reserve, Bandipur Tiger reserve and Wayanad wildlife sanctuary it offers a habitat contiguity of about 3300 km².

The reserve has a long wet season (April to December) and a short dry season (January to March). It receives rainfall from both southwest and north-east monsoons. There is a decreasing rainfall gradient from the west to the east of the Tiger Reserve. Two peaks of rainfall can be seen in the eastern part of the reserve, one during South west Monsoon in the month of June (100-150 mm) and the second during the North East monsoon in the month October (200 mm). The temperature ranges from 18^0 C during winter in the month of December to 35^0 C in summer in the month of April.

Floristically, Mudumalai wildlife sanctuary, as part of study of the flora of Nilgiris had been explored extensively and published[2]. D. Stephan (1994)[3] studied the Flora of Mudumalai Wild Life Sanctuary, followed by Suresh *et.al.*[4]. Further the Family Zingiberaceae of South India has been well documented by Sabu[5].

Materials and Methods

During recent botanical exploration in the Tiger Reserve, it was encouraging to note that members of family Zingiberaceae, which have been disappearing from their habitats in Kerala and Karnataka due to anthropogenic pressure, have found refuge in the humid zones of this Tiger Reserve and have not been reported from these forest earlier. All the species described here are the first report from Mudumalai Tiger Reserve.

CURCUMA LONGA

Curcuma longa found its way into the pages of Van Rheede's "Hortus Malabarica" as *Manjellakua*.

Curcurma longa L., Sp.Pl. 1:2.1753, *pro max . parte*; Koenig on Retz., Observ. Bot.(Retzius) 3: 72.1783; Roxb., Asiat. Res.11: 340. 1810, Fl. Ind. (Roxburgh) 1:32.1820; Baker in hook .f., Fl. Brit. India 6: 214. 1892; K. Schum in Engler, Pflanzenr. 4(46): 108. 1904: C.E.C. Fisch. in Gamble, Fl. Madras 8: 1483.1928; B.L. Burttand R.M. Sm., Notes Roy. Bot. Gard. Edinburgh 31: 185. 1972, in Dassan., Revis. Handb. Fl. Ceylon 4: 500. 1983; B.L. Burtt, Notes Roy. Bot. Gard. Edinburgh 35: 209.1977, in Manilal, Bot. Hist. Hort. Malabaricus. 144.1980: Nicolson *et al.*, Interpret VanRheede's Hort. Malab. 317.1988; Mangaly and M. Sabu, Rheedea 3(2):155.1993; K.G. Bhat, High Pl. Indian Subcont. 4:82.1993, Fl. Udupi 627. 2003: M. Sabu and Mangaly, Proc. 2nd. Symp. Fam. Zingiberaceae 20. 1996.

Rhizome 2-3X2-3 cm, conical, deep orange – yellow inside, strongly aromatic; sessile tubers many, cylindrical, branched; root tubers rare. Leafyshoot80-120 cm tall, pseudostem c. 30cm long. Leaves 4-6,distichous; petiole 35-40 cm long; lamina 45-60 X15-20cm, oblong–lanceolate, tapering at both ends, margins wavy, glabrous, pubescent towards the apex; ligule short, Inflorescence central, 25-30 cm long; peduncle 15 cm long, concealed within the leaf sheaths; spike 8-10 cm long with a dinstinct white coma. Coma bracts 8-10, 7X3.5 cm, spreading. Fertile bracts 25-30, 4.5-5.5 X 3-4.5 cm, compactly arranged, lower half of adjacent bracts fused to form pouches, apexrecurved, pale green , lower bracts subtend cincinni of two flowers and upper bracts one flowered. Flowers 4.5-5.5 cm long, equal to bracts. Bracteoles large, outer 3.2 cm, ovate – oblong, inner 1.5X1 cm, calyx truncate, 1 cm long, minutely 3 lobed at apex, white, outer surface minutely pubescent. Corolla tube 2.5 cm long, white , glabrous ; lobes unequal; dorsal lobe larger, 1.5 X 1.7 cm, concave, white, hooded, hood hairy, lateral lobes linear, 1.5 X 1.2 cm, white, glabrous. Labellum c. 2.2 X 2.5 cm, trilobed, middle lobeemarginate, light yellow with a median dark yellow band. Lateral staminodes linear, 1.5 X 0.8 cm, apex incurved, anther – thecae 4 mm long, spurred; spurs 3 mm long , parallel. Epigynous glands two, 5 mm long. Ovary 5mm long, tricarpellary, syncarpous; ovules many,axile placentation, pubescent towards the apex. Style long , filiform; stigma bilipped.

Flowering: July-Octobe. **Fruiting**. Fruiting not seen.

Distribution in Mudumalai Tiger Reserve: The herb is seen growing in the shade of large trees in the semi- evergreen forests. Rare.

Specimen examined: Kerala, Quilon, Kulathupuzha , 19.7.79, *C. N.Mohanan*, 63180 (MH), Karnataka : South Kanara Dt.; Udupi, Bhat 1981 (PPCH).

CURCUMA MONTANA

Curcuma montana Roxb., Pl. Coromandel.2:28.t.151.1802, Asiat. Res. 11:342.1810, Fl. Ind. (Roxburgh) 1: 35.1820: Baker in Hook. f., Fl. Brit. India 6:214.1890 (in part); K. Schum. in Engler, Pflanzenr. 4 (46): 106. 1904; C.E.C Fisch.in Gamble, Fl. Madras 8: 1483.1928; B.L. Burttand and R.M. Sm., Notes Roy. Bot. Gard. Edinburgh 31:226.1972; A.S. Rao and D. M Verma, Bull. Bot. Surv. India 14:122.1972; Mangaly and M. Sabu, Rheedea 3(2): 158. 1993; K. G. Bhat, High Pl. Indian Subcont. 4:82.1993: M. Sabu and Mangaly, Proc. 2nd Synp. Fam. Zingiberaceae 20.1996.

Rhizome globose, 3-4 X 2.5-3.5 cm, ovate – conical, pale orange – yellow within, darker towards the centre; sessile tubers many, branched: roots fleshy: root tubers fusiform. Leafy shoot 80-100cm tall. Leaves 20-30cm, oblong, lanceolate, cuneate at base, pubescent beneath. Inflorescence central, 30-35- cm long, peduncle 20 cm long, concealed within the petioles; spike 10-15 cm long with a distinct coma. Coma bracts 7-8, 5 X 3 cm, white with pink in the distal half, fertile bracts 20-24 , 5 X 4 cm, obovate, connate at base, apex slightly recurved, light green with pink patch, minutely pubescent. Bracteoles 2.5 X 2 cm, apex rounded, translucent. Flowers 4.5-4.7cm long, almost equal or slightly smaller than the bracts. Calyx8 mm long, truncate, 3 lobed, lobes ovate. Corolla tube 3cm long, lobes unequal; dorsal lobe 1.5 X 1.2 cm, hooded at apex, hood pubescent, white, lateral lobes linear, 1.2 X 1 cm, white. Labellum 1.8 X 1.6 cm, 3 lobed, middle lobe with an apical notch, margin undulate, deep yellow. Lateral staminodes 1.2 X 1 cm, apex incurved, included, light yellow. Stamen light yellow; filament broad; anther –thecae 4 mm long, connective prolonged into hood; base spurred; 3mm long. Epigynousglands two, 4mm long, linear, pointed. Ovary 2-3 mm, trilocular with many ovules on apparently axile placenta; style long, filiform; stigma bilipped, included within the hood and thecae.

Flowering: July-September. **Fruiting**: Not seen.

Distributionin Mudumalai Tiger Reserve: In in shady, moist hill slopes. Rare.

Specimen examined: Kerala, Kollam Dt., Punalaur, *Venkatasubramanyam* 8396(FRC), Palakkad Dt.: Anamalais, *Fisher* 3459 (FRC).

HEDYCHIUM FLAVESCENS

Hedychiumflavescens Carey ex Roscoe, Monandr.t.50.1825; Wright, Icon. Pl. Indiae Orient. t.2008and 2009, 1853; Trimen, handb.Fl.Ceylon 4;245.1898; K. Schum. in Engler, Pflanzenr.4(46); 46. 1904; Turrill, Kew Bull. 369. 1914; C.E.C. Fisch. In Gamble, Fl, Pres. Madras 8: 1485. 1928; B.L. Burttand R.m. sm. In Dassan., Rev. Handb. Fl. Ceylon 4:507. 1983; K.G. Bhat, High. Pl. Indian Subcont.4:88.1993, Fl. Udupi, 631.2003: M. Sabu and Mangaly, Proc.2nd Symp. Fam. Zingiberaceae 21. 1996.

Etymology: The specific epithet refers to the yellow coloured flowers.

Rhizome thick, 2-4X3-4 cm, horizontal, perennial, light greyish-yellow within; roots many, fleshy. Leafy shoots 2-3 m high. Leaves sessile or very shortly petiolate, petiole 5mm long, hairy; lamina 30-50 X 6-8 cm, lanceolate- acuminate, tapering towards the base, glabrous above, densely pubescent below or lightly pubescent with dense pubescence along the midrib and margins; ligule 2-3 cm, entire, membranous, pubescent; leaf sheaths sparsely pubescent. Inflorescence terminal, more or less ovate,10-20X7-9cm. Bracts lower larger,4.5-5X3-3.5cm, broadly ovate, becoming smaller towards the top,3-4X2-3 cm, margin membranous, ciliate, other parts sparsely pubescent; each bract subtends a cincinnus of 3-4 flowers. Bracteoles 2.5-3X 1-1.3cm, obtuse, slightly 2 keeled, margin towards the apex and keels ciliate, outer surface pubescent. Calyx 4-4.5 cm long, equal to or slightly longer than the bract, sparsely pubescent, tip slightly 3-toothed, unilaterally split about half. Corolla tube

about twice the length of the calyx tube; lobes linear, unequal; dorsal 4.7X2.5 cm; laterals 4X1.2 cm. Labellum yellow, broadly ob-cordate, 4-5 X3.5 cm, bilobed, narrowed into a distinct claw at the base. Lateral staminode 4-4.5X 1-1.5 cm, spathulate. Epigynous glands two,4mm long, free from each other. Stamen slightly longer than the labellum,5-6cm long; filament linear, anther-thecae parallel,1.2cmlong.Stylelong, filiform, stigma club-shaped with a central raised portion, margin hairy. Ovary, 5X 3mm long, densely pubescent. Fruiting not common.

Flowering and fruiting: August- October

Distribution: In South India it occurs along the Western Ghats.

Habitat: Common along streams in semi-evergreen forest.

Specimens examined: Andhra Pradesh: East Godavari Dt: Dummakonda R.F., Subba Rao 68626 (MH); Kerala, Calicut Dt. Chedalath*, J.L.Ellis,*13.8.64,25262 (MH).

ZINZIBER MONTANUM

Zingiber montanum (K.D Koenig) Link ex Dietr., Sp. Pl.1: 52. 1831; B.L. Burttand R. M. Sm., Notes Roy.Bot. gard. Edinburgh 31: 194. 1972: Ramamamoorthy in C.J. Saldanhaand Nicolson, Fl. Hassan dist. 769. 1976; Theilade, Nord. J. Bot. 19(4): 396. 1999; M. Sabu, Folia Malaysaiana 4(1):27.2003.

Rhizome thick, 1-2 cm, perennial, fleshy, horizontal, aromatic, yellow inside. Leafy shoots 1-1.5m high. Leaves sub-sessile; ligule very short,2mm long, bilobed, pubescent; lamina 20-40 X 3-4 cm, linear- lanceolate, tip acute, base slightly rounded, upper glabrous, lower surface pubescent. Inflorescence borne separately from the leafy shoot; peduncle 10-25 cm long, clothed with pubescent sheaths; spike c. 6-8X 4cm, ovate, deep red. Bracts 3-305X 3-3.6cm, broadly ovate, sub-acute with a narrow membranous margin, purplish brown, pubescent. Bracteole 2-2.5 X 1.2-1.5 cm, obtuse, 3- toothed. Calyx c. 1.5 cm long, truncate, white, membranous, unilaterally split, glabrous. Corolla tube 2.3-2.5 cm long, pale yellow; lobes lanceolate, pale yellow; dorsal lobe 3.2X 1.5 cm, cymbiform; lateral lobes 2.5X 1 cm wide, yellowish-white, sub-orbicular, apex emarginated with crisped margins. Lateral lobes*c*. 8X5 mm, obliquely ob-ovate, erect. Filament short; anther thecae c. 1 cm; crest longer than the thacae. Style long, filiform, stigma obconic, margin ciliate. Epigynous glands linear, free from each other. Ovary 3-4 mm long, pubescent. Capsule *c.*1.5 cm in diameter, ovoid. Seeds very small purple.

Flowering and fruiting: June- August.

Distribution: Native to India**.** In South India it occurs along the Western Ghats.

Habitat: As undergrowth of moist and dense evergreen forests. Rare

Specimens examined: Kerala, Idukki Dt., *C.N Mohanan,* 26.5.82, 150460 (MH); Tamil Nadu, Nilgiri Dt., Kottamala R.F., *Vajravelu*, 46446 (MH).

ZINGIBER WIGHTIANUM

Zingiber wightianum Thwaites, Enum.Pl. Zeyl. 315. 1861; Baker in Hook.f., Fl. Brit. India 6: 244. 1892: Trimen, Handb. Fl. Ceylon 4: 257. 1898: K. Schum. In Engler, Pflanzenr. 4(46):186. 1904: C.E.C. Fisch., Rec. Bot. Surv. India 9: 178.1921, in Gamble, Fl. Pres. Madras 8: 1489. 1928: B.L. Burttand R.M. Sm. In Dassan., Rev. Handb. Fl. Ceylon 4:496. 1983: K.G. Bhat, High. Zingiberaceae 21. 1996: M. Sabu, Folia Malaysiana 4(1): 46.2003.

Rhizome thick, 2-2.5cm, fleshy with many roots. Leafy shoot 1.2 m high. Leaves almost sessile; ligule 5-6 mm long, membranous, bifid, lobes rounded, minutely pubescent; lamina 15-35 X 5-6 cm, oblong- lanceolate, tip acuminate, lower surface pubescent on the midrib, upper surface glabrous. Inflorescence produced separately on a leafless, shot stalk; peduncle 4-8 cm long, clothed with membranous sheath; spike *c*. 9 X 6 cm, ovate or oblong. Bracts 3-5X 1-1.2 cm, lanceolate, acuminate, greenish-red, slightly pubescent. Calyx *c*. 2cm long, obscurely 3 toothed, unilaterally split, green with red markings, sparsely pubescent. Corolla tube *c*.2.5cm long, yellowish-orange. Labellum*c*. 3cm long, cuneate, obovate, emarginated, yellow- orange, heavily marked deep purple–red; lateral staminodes*c*. 1 cm long; curved beak 8mm long, dark purple red. Epigynous glands 4mm long, linear, free from each other. Ovary 5mm long, slightly pubescent. Fruit *c.* 2.5 cm long, oblong, red. Seeds black, aril white.

Flowering and fruiting: February- August.

Distribution: Distributed in the Southern Peninsular India and Sri Lanka. Endangered in South India.

Habitat: As undergrowth of moist and dense evergreen forests at high altitudes.

Specimens examined: Kerala, Wayanad Dt.: Begur R.F., Ramachandran 68266 (MH). Tamil Nadu: Coimbatore Dt. Water Falls Estate, 1000m, Joseph 12803 (MH).

Conclusion

This study was an effort to identify and document the noteworthy members of family Zingiberaceae existing in Mudumalai Tiger Reserve. All the species reported here are recorded for the first time from Mudumalai Tiger Reserve.

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