

TAXONOMIC INVESTIGATION ON GENUS *LARSENIANTHUS* (ZINGIBERACEAE) OF SIANG VALLEY, ARUNACHAL PRADESH

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Abstract

The taxonomic investigation on genus *Larsenianthus* (Zingiberaceae) of Siang Valley, the key and detailed taxonomic description of each species provided. A plate of color photograph of each taxon is also provided for easy understanding and identification.

Keywords: *Larsenianthus*, Zingiberaceae, Siang valley, Taxonomic key

INTRODUCTION

The new Asian genus *Larsenianthus* W.J. Kress & Mood consists of four species and one variety viz. *L. careyanus* (Benth.) W.J. Kress & Mood, *L. wardianus* W.J. Kress, Thet Htun & Bordelon, *L. assamensis* S. Dey, Mood, & S. Choudhury and *L. arunachalensis* M. Sabu, Sanoj & Rajesh Kumar (Kress *et al.* 2010) and new variety of *L. arunachalensis* var. *reticulatus* Tatum and Das (2016). The genus is characterized by the combination of unique features such as narrow, elongate labellum with slightly thickened edges and a deeply channeled center combined with the small sub-orbicular cup-shaped lateral staminodes and strongly arched filament that clearly distinguish this genus from the closely related genus *Hedychium*. Phylogenetic studies based on plastid *trnK* intron and nuclear ITS DNA sequence data indicated that these species of *Larsenianthus* form a monophyletic lineage with the *Hedychium* J. Koenig.

The genus covers a large area of Sub-Himalayan forests in North-Eastern Bangladesh, the Indian States of Meghalaya,

Assam, Arunachal Pradesh and into upper Myanmar (Kress *et al.*, 2010). Only *L. wardianus* W.J. Kress, Thet Htun & Bordelon was described from Kachin State, northern Myanmar (Kress *et al.*, 2010).

The Siang valley of Arunachal Pradesh falls under tropical to sub-tropical evergreen forest crisscrossed with rivers and streams which is favorable for growth of Zingiberaceae species in Valley. The geographical parameters like altitudes ranges from 130 - 900 m (Ruksin-Pekii Modi), temperature range from 16 - 34 °C, relative humidity 54 - 98 % and sandy loamy soil enhance the luxurious growth of various Zingiberaceae species in the Valley. Among the five taxons of *Larsenianthus*, only one taxon, *L. careyanus* was not located in the Valley during the taxonomic investigation on the genus.

Detailed taxonomic description, keys, habitats and ecology of the species have been provided. Photographs of the recorded species from Siang Valley have also been provided for better understanding and identification.

Key to species:

- 1a. Plant robust, floral bracts white and green, floral bracts form pouches, spike white, viviparous on spike *L. careyanus*
- 1b. Plant slender or small, floral bracts red, floral bracts free, spike red 2
- 2a. Plant tall up to 120 cm, margins of floral bracts corrugate and denticulate, 1 flower per bract *L. assamensis*
- 2b. Plant short, margins of floral bracts entire and smooth, 2-3 flowers per bract 3
- 3a. Plant 60-70 cm tall, sheaths smooth, spike elliptic, leave base cuneate, beneath of young leaves pale purple and pubescence *L. arunachelensis*
- 3b. Plant 30-40 cm tall, sheaths reticulate, spike ob-conic, leave base rounded or chordate, beneath of young leave green and glabrous
..... *L. arunachalensis var. reticulatus*

1. *Larsenianthus arunachalensis* M.Sabu, Sanoj & T.Rajesh Kumar

Larsenianthus arunachalensis M.Sabu, Sanoj & T.Rajesh Kumar, sp. nov (2010).

Type: India: Arunachal Pradesh: Lohit Dt.: Lalpani, Hayuliang Road, N 27°56'28.2", E 096°22'21.9", 6 August 2009, *E.Sanoj & T.Rajesh Kumar* 105640 (Holotype: CALI!; Isotype: CALI!, ASSAM!).

Taxonomic description: Terrestrial, perennial and sparsely culm forming small herbs, up to 120 cm tall. **Root stock-** *rhizome*- cylindrical, green and purple, running horizontally, smooth, nodes and internodes with scales, less aromatic, distance of shoots is 17 cm apart, 0.7-1 cm wide, rooting at nodes. **Root-primary root-** purple or fleshy, arise from

nodes of rhizome, large, stilt, apex blunt and fleshy white, 15-29 cm long × 0.2-0.4 cm wide; secondary roots arise part of primary root, fibrous, fleshy white. **Leafy Stem-** erect, cylindrical, green with purple base, minute pubescence, 30-120 cm long × 1-2 cm wide, usually 1-2 leaves at terminal, 13-17 cm apart between adjacent leafy stems. **Leaves-** oblong-lanceolate, distichy, petiolate; *petiole-* short, chaniculate, minute pubescence, greenish pale brown, 2.5-3.5 cm long × 0.7 cm wide; *blade-* base attenuate obliquely, margin entire and undulate, upper surface deep green and glabrous, beneath pale green to purple with minute silvery pubescence, apex acuminate, 60-69 cm long × 16-21 cm wide; *ligule-* ovate-lanceolate, pubescence, easily dry and pale brown, 7.5-14 × 2-2.5 cm wide. **Inflorescence-** terminal, erect, reddish-purple; *peduncle-* cylindrical, minute pubescence, 28 cm long × 0.5 cm wide; *spike-* oval-elliptic, 14-16 cm long × 5 cm wide; *primary bracts-* 40-60 per spike spirally arranged, deep red, ovate-sub-orbicular, apex acute, free to base, prominent mid-vein, pubescence, margin thinner and translucent, apex acute with grey hairs, 2-flower per bract, 3.3-3.7 cm long × 2.5-3cm wide; *secondary bracts-* 1st bracts-ovate-oblong, navicular, membranous, upper part pale red, mid-region thicker, margin entire or minute corrugulate, apex acute, 3-3-4 cm long × 1.-1.4 cm wide; *second bracts-* ovate-oblong, upper part pale green, lower part pale pink, margin entire, apex acute, mid-vein prominent, 3.2 cm long × 1 cm wide. **Flower-** red, conspicuous, 2-4 flowers opening at a time; *floral tube-* red, dilated apically, 2-4 cm long × 0.2 cm wide. **Calyx-** base tubular, pale pink, membranous, apex tri-lobed, slit at one side, minute pubescence, loosely attach to floral tube, 1.7 - 2 cm long × 0.2-0.3 cm wide. **Corolla-** base tubular (3.5 cm long × 0.2 cm wide), deep red, 3-lobed, each lobe linear and

pink, spatulate, apex acute; *anterior lobe*- larger, adnate to filament, minute pubescence, apex acute, 2.2-2.5 cm long \times 0.2-0.3 cm wide; *lateral lobes*- linear, long, pink, insert below staminodes, 1.5-2.3 cm long \times 0.1-0.2 cm wide. **Staminode**- 2, oval-orbicular or ocicular, 2-lobed, adnate to labellum base, pink, concave, margin entire, 0.4 -0.5 cm long \times 0.3-0.4 cm wide. **Labellum**- ob-lanceolate-semi-spatulate, red, base channiculate with creamy yellow, base thicker, minute pubescence, apex dilated and acute, dilated apex creamy yellow, 0.8-2.8 cm long \times 0.2-0.3 cm wide. **Stamen**- 1; *filament*- lower part reddish pink, upper part creamy yellow, fleshy, channiculate, slender, reflex toward labellum, 1.5-2.5 cm long \times 0.2 cm wide; *anther*- fleshy white, 2-celled, each cell linear-oval, creamy yellow, 0.2-0.3 cm long \times 0.1 cm wide (each cell); *pollen grain*- oval-spherical, fleshy white and smooth. **Gynoecium**- *ovary*- sessile, reddish pink, minute grey pubescence, compressed, 0.3-0.5 cm long \times 0.2 cm wide; *glands*- 2, creamy yellow, 0.2-0.5 cm long \times 0.1 cm wide; *style*- fibril, long, white, 5-7 cm long \times 0.1 cm wide; *stigma*- fleshy white, funnel shape with ciliate margin.

Phenology: Flowering June-September. It prefers flowering during rainy period.

Distribution: *Larsenianthus arunachalensis* Sabu *et. al.* (2010) is narrowly endemic in Arunachal Pradesh and is known only from the type locality. It is highly endangered due to various anthropogenic activities.

Ecology: The plant naturally grows in shady area with sandy loamy soil above 400-700 m amidst of thick clumps of wild species of *Musa*.

Specimen examined: SIANG VALLEY: *Tatum*, Pasighat (East Siang district), 17/10/12, 1; 04/6/15, 69; Rengging (East Siang

district), 17/6/15, 72; Lokpeng (Siang district), 29/6/13, 20. **Additional examined:** MYANMAR. Sagain Region: Basin of Chindwin River, along the Nankhawaing stream, Nankhawaing area, Htamanthi Wildlife Sanctuary, 25°20' N, 95°17' E, 140 m, 27.10. 2014, *Mu Mu Aung MMA* 76 (RAF!, TNS!).

Notes: The plant resembles to *Curcuma* but it differs by terminal scarlet inflorescence without plumes, bracts free (no pouch) and rhizome not fleshy.

2. *Larsenianthus assamensis* S. Dey, Mood, & S.Choudhury

Larsenianthus assamensis S. Dey, Mood, & S.Choudhury, sp. nov. *PhytoKeys* 1: 15-32 (2010)

Type: India: Assam: Cachar Dist., Barail Wildlife Sanctuary, 260 m elevation, August 2007, *S. Dey*, 1012 (Holotype: CAL!; Isotype: ASSAM!).

Taxonomic description: Terrestrial, perennial and medium-sized to 200 cm tall herb. **Root stock**- *rhizome*- fleshy, sympodial, fibrous, elongates in distinct sections, bulbous, fleshy white-colored internally. **Leafy stem**- 5-12 per culm, erect or slightly decumbent, cylindrical, glabrous, base dilated, 100-200 cm long \times 0.5 cm wide. **Leaves** 6-12 per shoot, sessile-sub-sessile; *petiole*- 0-0.5 cm long, basal leaf sheaths 3-5, pale pink, drying dull brown, fugacious; *ligule*- green-pale purple, bi-lobed, membranous, readily dry off, 0.4 cm long \times 0.3 cm wide (each lobe), apex rounded; *blade*- elliptic-lanceolate, dorsal glossy deep green and glabrous, beneath pale green and densely pubescence, margin entire, base rounded, apex acuminate, 20-40 cm long \times 5-9 cm wide. **Inflorescence**- terminal, erect; *leafy bract*-1, lower part oblong and deep red, upper part

green leafy with minute pubescence; *peduncle*- short, greenish pink, 3-5 cm long × 0.4 cm wide; *sterile bract*- 1, lanceolate, margin purple and corrugate, 4 cm long × 1 cm wide; *spike*- ovoid, purple, 4-8 cm long × 3-4 cm wide. **Bracts**- *primary bracts*- 15-30 per spike spirally arranged, ovate, red, margin corrugate and denticulate, apex mucronate, pubescence, 3 cm long × 1 cm wide; *secondary bracts*- obovate-lanceolate, purple, dorsal pubescence, margin corrugate, apical part obliquely bilobed, 2 cm long × 1 cm wide. **Flower**- conspicuous, 1-2 per bract (usually only a single flower fertile). **Calyx**- tubular, pink, pubescence, apex 3-lobed, 8-1 cm long × 0.2 cm wide. **Corolla**- 3-lobes, lobed linear-lanceolate, pink, anterior lobe larger 1-1.4 cm long × 0.2 cm wide, lateral lobes 1 cm long × 0.2 cm wide. **Staminodes**- ovate, pink with translucent blotch, 0.5 cm long × 0.2 cm wide. **Labellum**- oblong, pink, lower margin thicker, apex minute 3-lobed, 2-2.5 cm long × 0.2 cm wide. **Stamen**- 1, *filament*- lower part, greenish pink, upper dilated pale orange, arch, chanculate for style, 1.6 cm long × 0.1 cm wide; *anther*- pink, oval, 0.4 cm long × 0.2 cm wide. **Gynoecium**- *ovary*- sessile, oval-oblong, densely grey pubescence, 3-locular, 0.2-0.3 cm long × 0.1 cm wide; *glands*- 2, pink, unequal, cylindrical, larger 0.3 cm long × 0.1 cm wide; *style*- fibril, pink; *stigma*- pink, exerted above anther. **Capsule**- oblong, pubescence, fleshy white, 1 cm long × 0.4 cm wide.

Phenology: Flowering September to early part of October.

Distribution: India: ASSAM (Barail Wildlife Sanctuary), ARUNACHAL PRADESH (Depii area of East Siang district)

Ecology: This species naturally occurs in the understory of Tropical semi-evergreen forest in very moist place along the streams at 100-

250 m elevation. Naturally, it prefers slope area along the streams.

Conservation status- *L. assamensis* Dey *et al.* (2010) is endemic to Assam and Arunachal Pradesh only. Due to the anthropogenic activities, it leads this species to a category *Near Threaten* (NT) under IUCN guidelines (IUCN Standards and Petitions Subcommittee 2010).

Specimen examined: SIANG VALLEY: Depii (East Siang), *Tatum*, 29/10/2016, 119.

Additional examined: ASSAM: Cachar Dist., Lakhicherra, Barail Wildlife Sanctuary, 24°59.053' N, 92°46.525' E. 150 m. elevation, 30 August 2007, S. Dey s.n. (living material only).

Note: The plant can easily be identified by its slender leafy stem, leaves lanceolate-linear, compact and elliptic scarlet terminal inflorescence, and floral bracts upper part corrugulate and dentate.

3. *Larsenianthus careyanus* (Benth.) W.J. Kress & Mood

Larsenianthus careyanus (Benth.) W.J. Kress & Mood, comb. nov.

Basynym: *Hitchenia careyana* Benth., Gen. Pl. 3: 643. 1883

Type: India: "Mts Sillet, Francis de Silva and William Gomez", 1832. Wallich Cat. Herb. Ind. 6595 (as *Curcuma careyana* in Wallich [1832]). Lectotype- (K!; iso-lectotypes: E!, BM!).

Taxonomic description: Perennial, terrestrial and culm forming herb. **Root stock**- *rhizome* semi-woody, variously branched, 2-2.5 cm wide, slight aromatic; *primary root*- fibrous, large, long, purple at the tip, 0.4 cm wide; *secondary root*- fibrous, fleshy, rootlets. **Leafy stem**- erect, culm 8-30 in numbers, pale

brownish-green, base dilated, 100-250 cm long \times 1-2 cm wide; basal leaf sheaths- 2- 3, dark green with sparse minute pubescence, turning brown. **Leaves**- distichy, 6-10 per stem, leaves apart 7-10 cm; *petiole*- sessile- 2.5 cm long; *blade*- oblong to lanceolate, margin entire, beneath pale green and silvery minute pubescence especially along mid-vein, upper glossy and dark green, base cuneate, apex acuminate, 30-67 cm long \times 16-20 cm wide; *ligule*- semi-translucent, oblong, green to pale brown, pubescence, apex truncate, 5-6 cm long \times 2.7 cm wide. **Inflorescences**- terminal, erect or curved upright, fleshy white, spike elliptical, 17-24 cm long; lower bract large and infertile; *peduncle*- cylindrical, light yellowish-green, 5-14 cm long \times 0.7-1.5 cm wide; *lower sterile bracts*- 2-4, ovate, spirally arranged, pouch, mid-part thicker and green, abaxial green with pale white base, margin lower entire, upper crenulate, margin thinner and hyaline-pale purple, apex mucronate and deflexed; 3-6 cm long \times 2- 2.5 cm wide, bear 2- flowers; 1-3 adventitious plantlets produced at the base of old inflorescence; **Floral bract**- *secondary bract*- ovate-lanceolate, white, membranous, minute reticulate, apex acute, 1 cm long \times 0.3 cm wide; *primary bract*- large, mid-region light green, margin white, margin membranous and thinner, apical part hooded and deflexed, mid-region thicker, 4 cm long \times 2.7 cm wide. **Flower**- conspicuous, 2-flower per bract, pale white- pink; *floral tube*- fleshy white, upper part dilated, glabrous, deflexed or curved near mouth, 3.5 cm long \times 0.2 cm wide. **Calyx**- lower tubular, apex 3- toothed, fleshy white, slit at one side, 1.3-1.5 cm long \times 0.2 cm wide. **Corolla**- 3-lobes, white with pale pink at apical part; lobes linear-lanceolate, membranous, curved and twisted; *anterior lobe*- larger, lanceolate, apex rounded and pale pink, 2 cm long \times 0.4 cm wide; *lateral lobes*- fleshy white, linear, deflexed, apex acute, 1.8

cm long \times 0.3 cm wide. **Staminodes**- 2, oval-sub-orbicular, adnate to lower part of labellum, fleshy white-pale pink, 0.3 cm long \times 0.2 cm wide. **Labellum**- ob-ovate, elongate, fleshy white-pale purplish pink, mid-part channeled or ridges, apical part wider, apical margin denticulate, apex hooded and bilobed, 3 cm long \times 1 cm wide. **Stamen**- filament- long and slender, white, arch 180° and chaniculate, 2.4 cm long \times 0.1 cm wide; *anther*- 2- cell, diverged apically, fleshy white, oval, 0.5 cm long \times 0.1 cm wide; *pollen grain*- spherical-oval, smooth and fleshy white. **Gynoecium**- *ovary*- sessile, oval, fleshy white, glabrous, compressed, tri-locular, each locule bear large oval ovules in axial placentation, 0.3 cm long \times 0.2 cm wide; *glands*- 2, pale yellow, 0.5 cm long \times 0.1 cm wide; *style*- fibril, fleshy white, upper part curved, 6.5 cm long \times 0.1 cm wide; *stigma*- funnel shape/infundibulum, fleshy white, exerted above anther, minute pubescence. **Capsules**- capsular dehiscent into 3-coiled, 2 cm long \times 1 cm wide.

Phenology: Flowering July-September, flowering acropetally, 4-6 flowers at a time.

Distribution: The species covers a large area of Eastern Himalaya in India (Assam, Meghalaya, Arunachal Pradesh, Manipur), Bangladesh.

Ecology: *Larsenianthus careyanus* is found in Tropical Semi-Evergreen forest. It prefers damp area and near the stream side with sandy loamy soil.

Locality: Pasighat area, Ruksin (East Siang); Mariyang road, Geku, Tuting (Upper Siang); Boleng, Pangin (Siang district); Aalo, Rumgong (West Siang).

Conservation status: *L. careyanus* is the most widespread species among the five species of the genus. But their habitats are gradually

declining due to anthropogenic activities; this species is categorized as *Near Threaten* (NT) under IUCN guidelines (IUCN Standards and Petitions Subcommittee 2010).

Specimens examined: SIANG VALLEY: Pasighat (East Siang district), *Tatum*, 15/10/12, 2; Pangin (Siang district), *Tatum*, 23/7/15, 75. **Additional examined:** INDIA: **Arunachal Pradesh:** Lohit Dist., 15 September 1969, A.S. Rao 47859 (CAL!); Tirap F. D., 10 November 1959, R. Seshagiri Rao 20004 CAL!). **Assam:** Dulong Reserve Forest, 21 November 1957, G. Panigrahi 11283 (CAL!); Kabakhal Reserve Forest, 9 January 1957, R. Seshagiri Rao 9077 (CAL!); Kakoi Reserve Forest, N. Lakhimpur, 13 May 1966, D.M.Verma s.n. (ASSAM!).

Note: This species is widely distributed through out the Siang Valley. It can be easily identified by culm formation, leafy stem robust and pale greenish brown, spike elliptical and fleshy white, labellum white-pale purplish pink, plant lets on old spike.

4. *Larsenianthus arunachalensis* var. *reticulatus* Tatum and Arup K. Das

Larsenianthus arunachalensis var. *reticulatus* Tatum and Arup K. Das (2016) var. nov. *Pleione* 10 (2): 375 - 378.

Type: Aalo, West Siang District, Arunachal Pradesh. Coll. 012, 21/07/2014. Holotype-ARUN, BSI, Itanagar (Arunachal Pradesh).

Taxonomic description: Perennial, sparsely culm forming and short herb. **Rhizome-** sympodial, semi-woody, fleshy white, covered with fugacious scales, distance between two leafy stems 2-3 cm apart, inner rhizome fleshy white with little aroma, 0.7-1 cm wide; **roots-** fibrous, primary root pale pink with whitish blunt apex, primary root minute pubescence, secondary roots arise from primary root

profusely. **Leafy stem-** erect, green, compressed, basal part covered with 2-3 reticulate green sheaths, young shoot green with the enclosing of reticulated green sheaths, 10-15 cm long × 2 cm wide. **Leaves-** 2 in mature leafy stem; **ligule-** oblong, membranous, apex rounded, 3 cm long × 2 cm wide; **petiole-** long and slender, pale greenish pink especially on dorsal surface, channiculate, pubescence, 8-11 cm long × 0.5 cm wide; **blade-** ovate-oblong, cordate-rounded base, margin entire, dorsal surface prominent nerves and rugosa, dorsal green and glabrous, beneath minute pubescence especially along mid-vein, 23-30 cm long × 13-17 cm wide. **Inflorescence-** terminal in between two apical leaves; **peduncle-** cylindrical, long, glabrous, apical part light green, 7-9 cm long × 0.5 cm wide.; **spike-** ob-conic-elliptic, no sterile bracts, 30-45 fertile bracts spirally arranged, 9-12 cm long - 2.5-3.5 cm wide. **Primary bracts-** pink especially upper part, oval-orbicular, 2.5-2.7 cm long & 1.5-1.7 cm wide, margin thin and entire, acute apex, adaxial surface slightly pubescence, abaxial smooth and celled. **Secondary bracts-** upper part pink, ovate, boat-shape with two prominent ridges wrapping the floral buds, 2 cm long × 0.8-1cm wide, apex acute, glabrous, bear two floral buds. **Flower-** reddish pink, sessile, 4cm long × 0.2 cm wide; **floral tube-** reddish pink, tubular, 2-3 cm long × 0.1-0.2 cm wide. **Calyx-** tubular, upper part reddish pink, basal part pale pink, 1-1.2 cm long × 0.2 cm wide, apex 3-toothed, slit at one side. **Corolla-** 3-lobes, lobes linear, curved, reddish pink, insert at equal level, equal size, grooved, apex dilated and acute, 1.8-2cm long × 0.2 cm wide. **Staminode-** two lobes, reddish pink, ovate-orbicular, adnate to base of the labellum, 0.3-0.4 cm long × 0.2-0.3 cm wide. **Labellum-** narrowly oblong in first half then dilated, semi-spathulate, base long and grooved, lower

part reddish pink, upper part dilated with yellowish apex, curved toward stamen, 2-2.2 cm long × 0.1-0.2 cm wide. **Stamen- filament-** lower part reddish pink, upper part pale yellow, curved at middle and just below anther cell, grooved, 1.7-1.8 cm long × 0.1 cm wide; **anther cell-** two, creamy yellow, each cell oval, dorsifixed, 0.2-0.3 cm long × 0.1 cm wide; **pollen-** spherical-oval, fleshy white and smooth. **Gynoecium- ovary-** sessile, glabrous, lower part creamy white, upper part pale pink, oval and compressed, 0.4 cm long × 0.2 cm wide, 3-loculae, each locule bear one yellow spherical ovule with axile placentation; **gland-** 2-celled, creamy white, apex pointed, clasping to style, 0.2-0.3 cm long × 0.1 cm wide; **style-** fibril, creamy white, 4cm long × 0.1 cm wide; **stigma-** tubule with fimbrous end, fleshy yellow. **Fruit-** Not seen.

Phenology: Flowering-June-August especially during rainy period. 2-4 flowers open simultaneously.

Ecology: The species is usually occur at high altitude areas (600-800 m) in Siang Valley of Arunachal Pradesh, India. It usually grows in shady and humid area, and prefers loamy soil.

Conservative status and uses: It is endemic in Arunachal Pradesh at high altitude (600-800 m). Due to human interference to their small habitat lead the specimen to *Near Threatened* (NT) under IUCN guidelines (IUCN Standards and Petitions Subcommittee, 2010). Traditionally the plant is used in ritual purposes only.

Specimen examined: SIANG VALLEY: Aalo (West Siang district), *Tatum*, Ori-Kabu area, 21/7/14, 74, Lokpeng, 20/5/16, 104, Tuting, 30/7/16, 109.

Note: *Larsenianthus arunachalensis* var. *reticulatus* Tatum & Das. is closely resemblance to *Larsenianthus arunachalensis*

Sabu *et al.* (2010) but its distinctive features like short and compressed leafy stem, leafy stem base green with reticulate sheaths and scales, leaf base cordate-rounded, leaves adaxial surface glabrous and rugose, and spike ob-conic vary from *L. arunachalensis* Sabu *et al.* (2010).

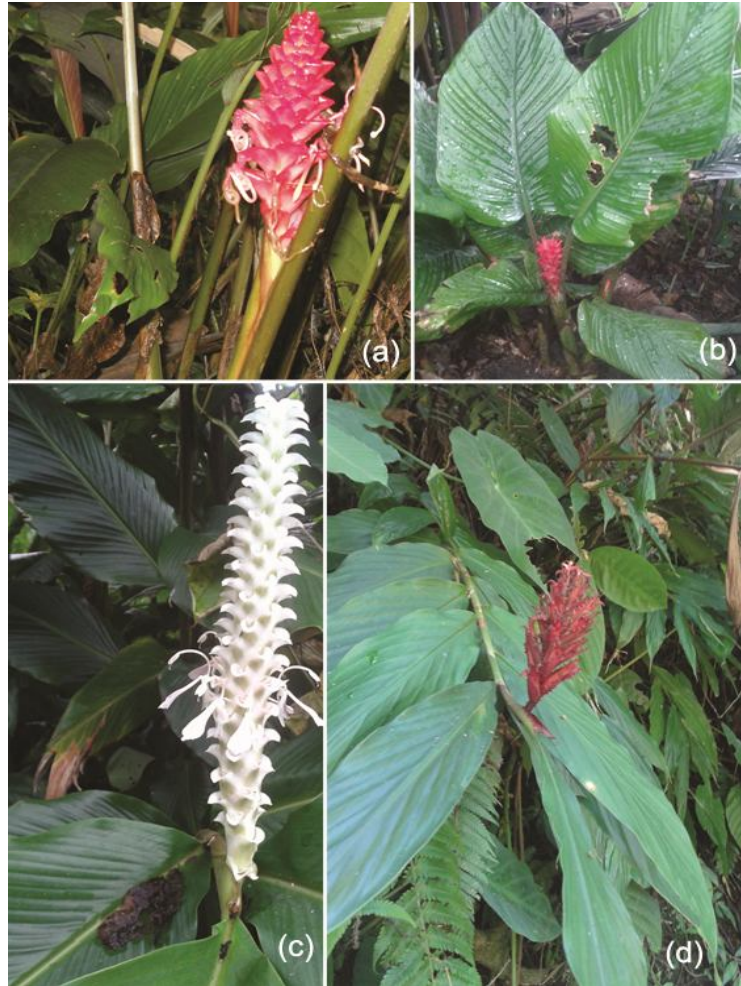
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Larsenianthus of Siang Valley: (a) *Larsenianthus arunachalensis*, (b) *Larsenianthus arunachalensis* var. *reticulatus*, (c) *Larsenianthus careyenus*, (d) *Larsenianthus assamensis*