

## ***Zingiber kangleipakense* (Zingiberaceae): A new species from Manipur, India**

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**ABSTRACT.** *Zingiber kangleipakense* Kishor & Škorničk. (Zingiberaceae) from Manipur, India is newly described and illustrated. A comparison with the most closely related species, *Z. longiligulatum* and *Z. roseum* is provided.

**Keywords.** Gingers, NE India, taxonomy, *Zingiber longiligulatum*, *Zingiber roseum*, Zingiberaceae

### **Introduction**

The genus *Zingiber* Mill. (Zingiberaceae, Zingibereae) is distributed in tropical to warm-temperate Asia with the highest diversity in the monsoonal parts of Asia, particularly in Thailand with 56 species (Triboun 2006) and China with 43 species (Wu & Larsen 2000). The exact number of species in the genus is not known. More than 250 names in *Zingiber* have been published, but this probably corresponds to about 100 to 150 species (Theilade 1999; Wu & Larsen 2000). Key characteristic features of the genus *Zingiber* include i) lateral staminodes fused to the labellum, ii) labellum not connate to the filament, iii) elongated, horn-like anther crest, wrapped around the style and iv) presence of a pulvinus at the base of the petiole, which distinguishes *Zingiber* from other ginger genera in the field even when sterile.

Roxburgh reported 11 species of *Zingiber* in India (1810, 1820). Later, Baker (1892) described 24 species from British India. Of these, only 16 fall within India's current boundaries. In the checklist of Indian monocots, Karthikeyan et al. (1989) listed 18 species, eight of which were reported by Sabu (2003, 2006) from South India. There is no recent work on the genus *Zingiber* from N or NE India.

In spite of some 60 new *Zingiber* taxa described in past twenty years from China (e.g. Tong 1987; Tong & Xia 1987, Tong & Liu 1991, Fang & Qin 1996), Vietnam (Theilade & Mood 2000), Thailand (e.g. Theilade 1999; Mood & Theilade 2002), Peninsular Malaysia (Theilade 1998; Lim 2001a,b, 2002, 2003), Borneo (Theilade & Mood 1997, 1999) and Philippines (Mood & Theilade 2001), no new *Zingiber* has been reported from India or Bangladesh recently.

While exploring in NE India, the first author found a *Zingiber* species growing quite abundantly in moist and shady areas of the Imphal valley in July 2000. It could not be matched to any Indian, Chinese, Thai or Indochinese species, nor to the protologues of the vast majority of other *Zingiber* species. Type specimens of the most closely related species have been examined at BK, BKF, CAL, HTBC, KUN, MH & P. The new *Zingiber* is thus described below.

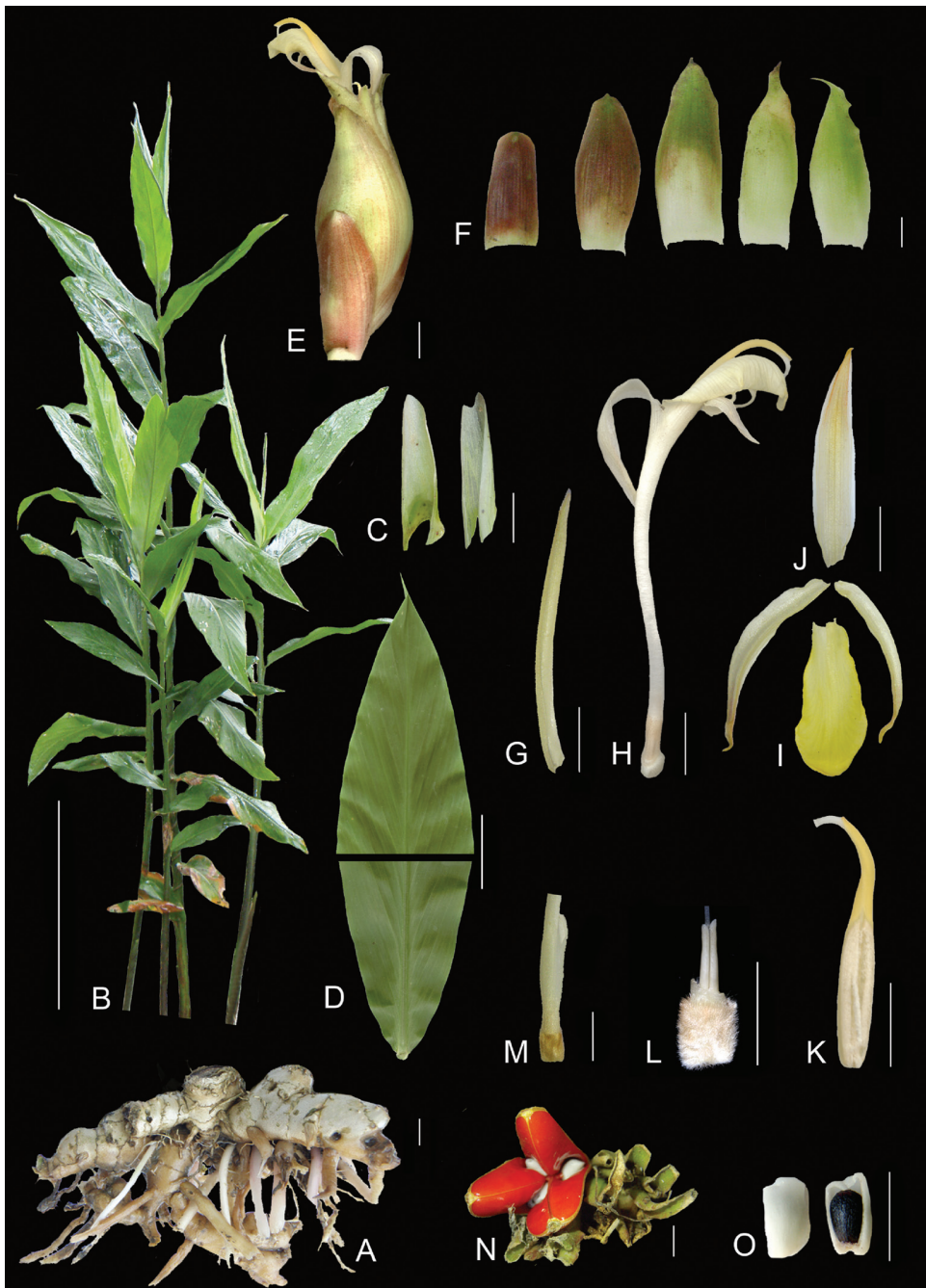
The measurements and descriptions provided are based on living material. The plant parts were photographed using a digital camera, while dissected materials were directly scanned using a flatbed scanner (Model: 2300c, Hewlett Packard), micro details were photographed using a stereo-zoom microscope (Model: SZ-II, Olympus, USA).

***Zingiber kangleipakense* Kishor & Škorničk., sp. nov.**

*Zingiberi roseo similis, robustiore (ad 1.7 m longo contra 0.9 m), bracteis viridibus (contra rubellis), corollae lobis luteis (contra clare rubris), antherae crista lutea (contra aurantiaca) differt.*

TYPUS: *Kishor 9*, India, Manipur, Imphal, Sagolband, c. 24°48'N 93°55'E, 780 m asl, 20 July 2000 (holo CAL; iso SING; iso Herbarium of Institute of Bioresources and Sustainable Development, Imphal). (Fig. 1 & 2)

Terrestrial rhizomatous herb, **rhizome** branched, mature branches up to 2.0 cm in diam., externally light brown, internally white when young, white to pale cream when old, with mild turmeric aroma. **Leafy shoot** 150–170 cm tall, erect, fleshy. Leaf sheaths green or with reddish tinge, glabrous or finely pubescent, with thin membranous margins; **ligule** 2–3.2 × 1.3–1.5 cm, slightly, unequally bilobed at apex when young, more or less entire later, glabrous, hyaline and fragile. **Leaves** 8–15 per pseudostem, sessile or shortly petiolate; **petiole** 0–5 mm long; **lamina** 35–42 × 7–8 cm, oblong-lanceolate, adaxially dark green, smooth, pubescent along side of midrib, abaxially off-green, pubescent, base cuneate, apex acuminate. **Inflorescence** generally arising from the rhizome on a separate short peduncle 0.5–1 cm, sometimes breaking through the leaf-sheaths up to 25 cm above the ground. **Spike** 5–8 × 3–4 cm, narrowly ovoid, bearing 15–20 flowers. **Bracts** 2.8–6.5 × 1.8–3.5 cm, outer 3–4 bracts oblong, apex rounded, green or tinged with purplish red, inner ones oblong-lanceolate, pale green, apex reflexed, cuspidate, shortly hairy, margins hyaline. **Bracteole** 3.8–4.3 × 0.8 cm, lanceolate, shortly pubescent on the outside, margins thin, membranous, cream coloured. **Calyx** c. 2.5 × 0.5 cm, tubular, white, membranous, tri-dentate with 1 cm longitudinal unilateral incision, pubescent. **Floral tube** slender c. 5 cm long, pale yellow to white towards the base, dorsal corolla lobe 2.5–3.0 × 0.4–0.6 cm, translucent cream at the base, deep yellow with reddish tinge at apex, strongly recurved; lateral corolla lobes c. 2.5 × 0.5 cm, coloured as the dorsal lobe, recurved, adhering basally to the ventral surface of the labellum at 1.2 cm from the apex. **Labellum** c. 3 × 1.5 cm, light yellow with wavy and crisped margins, side lobes absent or reduced to a 1 mm long, triangular vestige. **Anther** sessile, thecae 1.8 cm long; connective and crest



**Fig. 1.** *Zingiber kangleipakense*. **A.** Rhizome with roots. **B.** Pseudostems. **C.** Ligules. **D.** Apex and base of the leaf. **E.** Inflorescence. **F.** Bracts. **G.** Bracteole. **H.** Single flower (side view, calyx removed). **I.** Labellum (flattened). **J.** Dorsal and lateral corolla lobes (flattened). **K.** Anther with crest (front view). **L.** Ovary with epigynous glands. **M.** Ovary with calyx and base of the floral tube. **N.** Mature fruit with seeds. **O.** Seeds embedded in aril. Scale bars: A, C, E–K, M–N (1 cm); B (50 cm), D (5 cm), L, O (5 mm). Based on *Kishor 9*. (Photos: Rajkumar Kishor)

yellow. **Pollen**  $277 \times 158 \mu\text{m}$ , ovoid. **Style** 7.5 cm long, filiform, stigma projecting from the anther crest, ostiole hairy. **Epigynous glands** two, 4 mm long, free from each other, cream. **Ovary** c.  $4 \times 3\text{--}4$  mm, trilobular with many ovules, placentation axile, densely pubescent outside. **Fruit** a capsule,  $4 \times 2.5$  cm, ovoid-elliptic, trigonous, green with red tinge outside, bright red inside; seeds up to 6 mm long, black, obovoid, completely covered in white aril.

*Distribution, habitat and ecology.* The species is known to occur in at least three districts of Manipur, namely Imphal West, Imphal East and Sanapati. It grows at 750–1400 m above sea level in Imphal Valley usually in the undergrowth of groves and bamboo brakes, preferring moist and shady areas. It may be found cultivated around homesteads too. The prevailing climate in the valley is monsoon sub-tropical with an annual rainfall of 1375 mm and a temperature range of 12–27°C.

*Phenology.* Flowering June–July, fruiting August–September.

*Etymology.* The specific epithet is assigned in honour of Kangleipak, an old name of Manipur, which is the natural habitat of *Z. kangleipakense*. This area provides an important contribution of plant and animal species to the Indo-Burmese biodiversity hotspot.

*Vernacular names and uses.* In Manipur, it is locally known as ‘Namra’. Young rhizome along with the pseudostem are sold on local vegetable markets in Imphal and neighbouring villages and are used as a minor vegetable by cooking with fermented fish, potato and other items in a preparation commonly known as ‘iromba’.

*Notes.* *Zingiber kangleipakense* is similar to Indian *Z. roseum* (Roxb.) Roscoe from India (Roxburgh 1798, 1820). Both species have thick, fleshy, white to pale cream rhizomes, shortly petiolate leaves of similar size and shape, inflorescences arising from the rhizome on a short peduncle embedded in the ground and single-lobed yellow labellum. The lamina of more robust *Z. kangleipakense*, is, however, pubescent abaxially on the sides of the midrib, has green and broader bracts, yellow corolla lobes and a yellow anther crest. *Z. kangleipakense* is similar also to Chinese *Z. longiligulatum* S.Q.Tong, but the latter reaches only up to 1 m, has larger leaves, narrower bracts, patent dorsal corolla lobe and orange anther crest. More detailed comparison of characters among *Z. roseum*, *Z. longiligulatum* and *Z. kangleipakense* is presented in Table 1.

Triboun (2006) pointed out the difficulties in placing *Z. junceum* and *Z. barbatum* at infrageneric level as these species produce inflorescence both basally and terminally fitting into section *Zingiber* and *Dymczewiczia* respectively. For similar reasons, it is difficult to place *Z. kangleipakense* unequivocally in a section. Although the shape of the labellum and the inflorescence borne directly from the rhizome resemble numerous species of section *Cryptanthium*, the inflorescence of *Z. kangleipakense* sometimes protrudes through the pseudostem, a characteristic known from section *Pleuranthesis*.

This species was previously misidentified as *Amomum aromaticum* by Singh et al. (2003).





**Fig. 2.** *Zingiber kangleipakense*. **A.** Leafy shoot. **B.** Inflorescence with mature, opened fruit. **C.** Inflorescence with closed, not fully matured fruit. **D–E.** Inflorescence breaking through the leaf-sheaths of pseudostem. **F.** Inflorescence emerging from the rhizome at the ground level. Based on *Kishor 9*. (Photos: Rajkumar Kishor)

**Table 1.** Comparison of characters of *Zingiber kangleipakense* with *Z. roseum* and *Z. longiligulatum*, the latter two as observed from original descriptions, original illustrations and types.

Character	<i>Z. kangleipakense</i>	<i>Z. longiligulatum</i>	<i>Z. roseum</i>
Rhizome	white to pale cream internally	not described	white internally
Leafy shoot	150–170 cm	80–100 cm	60–90 cm
Ligule	2–3.2 cm long, entire or bilobed, glabrous	4–5 cm long, entire, pubescent	not mentioned
Lamina	35–42 × 7–8 cm, midrib sides pubescent abaxially	43–49 × 10–11 cm, pubescent abaxially	30 × 8–10 cm, both sides glabrous
Peduncle	up to 1 cm when arising from the rhizome, rarely protruding through the pseudostem up to 25 cm above ground.	2–6 cm	not specified; short, up to c. 5 cm based on drawing
Bracts	2.8–6.5 × 1.8–3.5 cm, outer 2–3 green with purplish red tinge, inner green, apex cuspidate, cusp hairy	4–4.5 × 0.8–0.9 cm, green, pubescent, apex acuminate	reddish
Floral tube	white to pale yellow, glabrous	yellowish at apex, densely pubescent	white to pale yellow
Corolla lobes	yellow with reddish tinge terminally, dorsal corolla lobe strongly reflexed	yellowish, dorsal corolla lobe patent	bright red, dorsal corolla lobe strongly reflexed
Labellum	entire, single-lobed or with rudimentary side lobes, unspotted, light yellow	entire, single-lobed, yellowish, side lobes absent	entire, single-lobed, light yellow
Anther crest	light yellow	orange	orange

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