

## ***Arisaema fimbriatum* (Araceae) and its Intraspecific Variation**

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### **Abstract**

The status of *Arisaema fimbriatum* Mast. is discussed based on the examination of herbarium material as well as living plants in the wild and in cultivation. *A. fimbriatum* is recognised as having two subspecies: subsp. *fimbriatum* and subsp. *bakerianum* (Engl.) G.Gusman established here.

### **Introduction**

*Arisaema fimbriatum* Mast. occurs exclusively on limestone in Peninsular Malaysia and the southernmost provinces of Thailand, i.e. in the Malesian phytogeographical region. The species name recalls the spadix-appendix covered with long, thin and filiform bristles. The crimson and crinate appendage, protruding far out from the spathe is so outstanding that *A. fimbriatum* is one of the most remarkable *Arisaema* species yet described from this area.

M.T. Masters encountered the plant in autumn 1884 in Sander's Nursery, St. Alban's, England, and described it the same year in *The Gardeners' Chronicle*.

In 1911, a new plant was introduced in the trade, first called *A. bakeri* Hort. ex Ridley or *A. bakerianum* (Hort.) Sander, which Engler (1920) eventually described as *A. fimbriatum* var. *bakerianum* in *Das Pflanzenreich*. Nevertheless, some authors question the relevance of this variety and treat *A. fimbriatum* var. *bakerianum* as synonymous with *A. fimbriatum*.

I have gathered new information from examination of herbarium specimens, living plants in the field in Malaysia and Thailand, and also in cultivation. As a result of their morphological differences, the two taxa are considered distinct, and, from their separate geographical distributions, the two varieties of *A. fimbriatum* are changed to subspecies.

### **History**

*Arisaema fimbriatum* was first discovered in cultivation in Sander's nursery among orchids collected in the Philippines (Masters, 1884). Later, when reintroduced by Charles Curtis from Langkawi Islands, its correct Malaysian origin was established

in the south of Langkawi. Its distribution extends in Peninsular Malaysia from Perlis, Kedah, Perak, Kelantan, Pahang, as far south as Selangor. In Perlis it is found in the Tale-Ban National Park, along the Thai border, always growing in crevices in limestone rocks. Its northernmost limit seems to be in Kuan Nieng, Khao Chang Low, Thailand, where Kerr collected it in 1928 (Jacobs, 1962) as no specimen of *A. fimbriatum* has been found further north of Kerr's location.

Gagnepain (1941), apparently unaware of Master's species, described Kerr's specimen as *A. putii* Gagnep. Hetterscheid & G.Gusman (2003) have shown that the three syntypes of *A. putii* cited by Gagnepain include at least two different species! This confusion was recently resolved and the lectotypification of *Kerr 15899* (K) established the synonymy of *A. putii* with *A. fimbriatum*.

*Arisaema fimbriatum* subsp. *bakerianum* was first collected by Curtis in 1896 during a boat trip along the coast from Penang to Kasom (Curtis, 1897). As noted on *Curtis 3281*, it was collected in "Kasoom on limestone island near the mouth of the river", today in the Ao Phang Nga National Park.

1. *Arisaema fimbriatum* Mast. subsp. *fimbriatum*, Gard. Chron. 22 (1884) 680.

**Type:** Gard. Chron. 22 (1884) fig. 119.

**Synonym:** *Arisaema putii* Gagnep., Notul. Syst. (Paris) 9 (1941) 127. **Lectotype:** *Kerr 15899*, THAILAND, Kuan Nieng, Khao Chang Low, 24 July 1928 (K).

Plant deciduous, up to 60 cm tall and wide. *Subterranean stem* a subglobose tuber, 3–5 cm wide, 2–3.5 cm high, cream. *Roots* fleshy, few. *Pseudostem* the length of the petioles or longer, 25–30 cm long, 1.8 cm wide at the base, pale magenta or pale green. *Cataphylls* up to 5, lanceolate, 2–30 cm long, similar in colour to the pseudostem. *Petiole* 20–25 cm long, 1 cm wide at the base, similar in colour to the pseudostem with faint, pink stripes in the upper part. *Leaves* usually 2, trifoliolate. *Leaflets* glossy dark green above, paler with slightly prominent veins beneath; subsessile or shortly petiolulate; margins entire; apex acuminate ending in a short arista, 0.5 cm long. *Central leaflet* elliptic ovate, 20–24 cm long, c. 15 cm wide; base cuneate or convex. *Lateral leaflets* ovate, slightly asymmetrical, nearly the size of the central leaflet; base convex. *Inflorescence* above the foliage, emerging when the leaves unfold. *Peduncle* 20–30 cm long, 6 mm wide at the base, similar in colour to the petioles. *Spathe-tube* cylindrical, slender, 6–7 cm long, 1.5–2 cm wide, dark crimson with pale green stripes outside and white stripes inside; mouth-margins straight to hardly recurved. *Spathe-limb* horizontal, ovate lanceolate, 7–10 cm long, 3.5–4 cm wide, dark crimson and white striped, with a green hue outside. *Spathe-tip* acuminate. *Spadix-appendix* long exerted from the spathe at anthesis, 8–15 cm long, slender; exerted portion a crimson, pendulous, whip-like tail, covered with c. 25 mm long, filiform,



Figure 1: *Arisaema fimbriatum* subsp. *fimbriatum*  
A) Flowering plant; B) Spadix appendage; C) Spathe

dark crimson, bristly projections; included portion light yellow-green, crimson striped, 4–6 mm across at the base; with scattered green neuters, c. 5 mm long; lower part sessile. *Spadix* male or bisexual. *Male part* c. 3 cm long, 0.5 cm across; stamens loosely arranged, borne on a green stalk, c. 1 mm long, 2–4-anded, anthers crimson; thecae dehiscent by an elongated pore. *Female part* c. 2 cm long and 1.5 cm across; pistils loosely packed; ovaries ovoid and green, stigma stalked and penicillate. *Infructescence* subcylindrical, c. 2.2 cm long and 1.8 cm across, borne on an erect peduncle when ripe; receptacle cream. *Berries* densely packed. Seeds 1 mm in diam.; testa brown. *Germination* a simple eophyll is produced just after germination.

*Flowering period*: May to August. *Ripening time*: November.

*Distribution*: Peninsular Malaysia (Kedah, Kelantan, Pahang, Perak, Perlis, Selangor) and SW Thailand (Songkhla).

*Habitat*: Primary, tropical lowland evergreen rain forest, 100–300 m altitude, growing in rich humus, limestone crevices.

*Additional material*: MALAYSIA – KEDAH: Langkawi, Curtis 1890 (SING), Curtis 1893 (SING), Moosa 1896 (SING), Bukit Puteh Corner s.n. 20 November 1941 (SING). Pulau Dayang Bunting FRI 44601 7 May 1996 (KEP), Telok Apau Haniff & Nur SFN 7490 (SING). KELANTAN: Gua Musang UNESCO Limestone Expedition 427, 6 August 1962 (SING). PAHANG: Bukit Sagu Nur SFN 25160, 14 October 1931 (SING); Kota Glanggi Ridley s.n., 1891 (SING). PERLIS: Pulau Rabana Henderson SFN 23099 (SING). PERAK: 10 km south of Ipoh Ng FRI 1605, 4 October 1966 (SING). SELANGOR: Batu Takun near Kanching Nur SFN 34376, 3 November 1937 (SING).

*Notes*: FRI 44601 clearly shows that the subterranean stem is tuberous and not rhizomatous as has sometimes been erroneously stated in the literature (Govaerts & Frodin, 2002).

2. *Arisaema fimbriatum* subsp. *bakerianum* (Engl.) G. Gusman stat. nov.

**Type**: Curtis 3281, THAILAND, Kasom, “on limestone island near mouth of the river”, November 1896 (lectotype SING, selected here).

*Synonym*: *A. bakeri* Ridl., Journ. Roy. Asiat. Soc. Bengal 59 (1911) 218. *A. bakerianum* Engl. Pflanzenr. 73:4, 23F (1920) 152, pro syn. *A. fimbriatum* var. *bakerianum* Engl. Pflanzenr. 73:4, 23F (1920) 152.

Subspecies *bakerianum* differs from subsp. *fimbriatum* by the following characters: *Shoot* usually with 1 leaf, rarely 2. *Leaflets* pale green beneath with a reddish hue when unfolding. *Inflorescence*: *spathe-tube* white-green, unstriped outside and inside; *mouth margins* light green; *spathe-limb* crimson outside paler inside with a white



Figure 2: *Arisaema fimbriatum* subsp. *bakerianum*  
A) Inflorescence; B) Spadix appendage; C) Habitat

spot at throat level, surrounded by light green margins; *spadix-appendix* included portion pale yellow-green and glabrous.

*Distribution*: SW Thailand, endemic on islands in Ao Phang Nga (Bay of Phang Nga) and Ao Phra Nang.

*Habitat*: North facing slopes in limestone crevices, beneath bushes, just above sea level.

*Additional material*: THAILAND. From islands facing Kasom: *Curtis* 3262, November 1896 (SING); *Curtis* 3281, November 1896 (BM, SING); *Curtis s.n.*, 1897, a specimen which flowered in Penang BG in April 1897 (SING); *Curtis* 8947, 1897 (SING). Krabi, Ao Phra Nang: *Gusman* 03076, July 2003 (BR).

*Notes*: *Curtis* 3281 has a tuberous subterranean stem. *Curtis* also noted that “*A. fimbriatum* has always two leaves, this has one”, in full agreement with observations I made in the field. I had the opportunity to observe hundreds of plants, which were always on islands and near the seashore. By contrast, limestone outcrops on the mainland along Ao Phang Nga and Ao Phra Nang did not harbour any specimens of *A. fimbriatum*. This may result from the coolness the proximity to the sea provides on these islands.

## Discussion

Reliable morphological characters that separate the two subspecies are summarized in Table 1 and illustrated in Figures 1 and 2.

Table 1. Morphological differences between *Arisaema fimbriatum* subsp. *fimbriatum* and subsp. *bakerianum*.

SUBSPECIES	<i>fimbriatum</i>	<i>bakerianum</i>
CHARACTERS		
Number of leaves	usually 2	usually 1
Colour of the spathe-limb	crimson with white stripes	crimson without stripes
Colour of the spathe-tube	crimson with white stripes	white-green without stripes
Base of appendix	hairy	glabrous

In addition, there are clear differences in both geographic distribution and habitat. Their distributions are allopatric, which justifies the modification of status from variety to subspecies. *A. fimbriatum* subsp. *fimbriatum* is widespread on limestone in Peninsular Malaysia from the Langkawi Islands south to Selangor. Curtis, who visited the west coast of the Peninsular Malaysia from Penang to Kasom, did not collect specimens of subsp. *fimbriatum* north of Langkawi, nor do I know of other specimens collected north of Songkhla. In contrast, *A. fimbriatum* subsp. *bakerianum* is restricted to islands southwest of the Thai coast, roughly from Kasom to Krabi. A gap separates the distributions of the subspecies.

Nor do they share the same habitat even though both are always found growing on limestone rocks. All specimens of subsp. *fimbriatum* I know were collected on hills at c. 100 m altitude or above, sometimes quite far from the coast, while I always found populations of subsp. *bakerianum* on islands growing on cliffs close to the shore only a few metres above sandy beaches.

### Taxonomic position

Hara (1971) chose *Arisaema fimbriatum* as the lectotype of *Arisaema* sect. *Fimbriata* Engl. Today, sect. *Fimbriata* has been revised (G. & L. Gusman, 2002) and includes only tuberous and deciduous species. The rhizomatous, evergreen species are now included in the new sect. *Anomala* G. & L. Gusman (in Hettterscheid & G. Gusman, 2003). All species in sect. *Fimbriata* are tropical species found in NE India, Myanmar, Thailand, Cambodia, Vietnam, S China, Malaysia, Indonesia, the Philippines, and possibly in Laos. All of them have spadix appendages with neuters, at least in female or bisexual appendages, present at the base and, often also to the part of the appendage protruding from the spathe-mouth. In most species, these bristles are stiff and fleshy. In *A. fimbriatum*, the appendage, outside the spathe-tube, is densely covered with long, flexuous, bristly filaments. In sect. *Fimbriata*, the closest species is *A. barbatum* Buchet from Java, which has the same kind of hairy appendage. Engler specially created sect. *Barbata* for *A. barbatum* (and *A. balansae*), a section no longer in use today. They are easy to separate: namely by their spathes. It is auriculate at the mouth in *A. barbatum*; the margins of the spathe-mouth are straight in both subspecies of *A. fimbriatum*.

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