

## Comparative Studies Of Different *Globba* Species In Bago Yoma And Rakhine State

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### Abstract

*Glabba* is a genus of plants in the ginger family and contains about 100 species including about 17 species in Myanmar. The four *Globba* samples at 17° 21' 30.0" N 96° 25' 33.0" E were collected from BagoYoma whereas the three *Globba* samples at 20° 26' 16.044" N 92° 56' 11.516" E were also collected from Rakhine State. Morphological characters of the collected samples were undertaken at Botany Department, Sittway University. The taxonomic description of the collected species was presented in systematic position of angiosperm phylogeny group APG III. The morphological and taxonomical characters of the species: *Globba sessiliflora* Sims. *G. bulbifera* Roxb., *G. marantina* L. and *G. pauciflora* Baker. from BagoYoma, *G. arracanensis* Kurz, *G. orixensis* L. and *G. marantina* L. from Rakhine State were mentioned in this paper. *G. arracanensis* Kurz. is only found in Rakhine State and it is now known not to be extinct but this threaten species should be conserved due to the rapid degradation of the forest in this region.

**Keywords:** *Globba sessiliflora* Sims., *G. bulbifera* Roxb., *G. marantina* L., *G. pauciflora* Baker., *G. arracanensis* Kurz. And *G. orixensis* L.

### Introduction

*Globba* is belonging to the family Zingiberaceae. In Myanmar, the family Zingiberaceae comprises 25 genera and 159 species are recorded. Zingiberaceae family distributed in all States and Regions of Myanmar, however, many species are found abundantly in Bago, Mandalay, Taninthayi, Sagaing Regions and Kachin, Kayah, Kayin, Mon, Rachine and Shan State (Saw Lwin, 2014).

*Globba* is the third largest genus of the Zingiberaceae with 100-110 species in the world. It is distributed throughout tropical and parts of subtropical Asia, ranging from India to southern China, South and East Philippine and New Guinea with the centre of distribution in monsoonal South east Asia, especially Thailand and

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Myanmar (Williams *et al.*, 2004). Flowers of *Globba* are striking orange, yellow, purple or white, contrasting with the often green inflorescence bracts (Endress 1994, Takano and Okada 2003). They possess extraordinarily specialised morphology, even within the context of Zingiberaceae, in which there is invariably a single fertile stamen (the adaxial stamen) and two sterile inner androecial members are fused and petaloid, forming an abaxial labellum (Kirchoff 1988a, 1997, 1998; Endress 1994). In *Globba* the stamen is exserted well above the perianth whorl, and possesses a single large reflexed anther with several characteristic triangular appendages.

The aim and objectives of this study are to identify the morphological characters of the collected specimens of the family Zingiberaceae, to classify the taxonomic characters of the collected samples and to give the information for rare species of *Globba arracanensis* Kurz.

## **Materials And Methods**

### **Collection and identification of plant samples**

The four *Globba* samples at 17° 21' 30.0" N 96° 25' 33.0" E were collected from Bago Yoma whereas the three *Globba* samples at 20° 26' 16.044" N 92° 56' 11.516" E were also collected from Rakhine State.

Morphological study of the collected samples were undertaken with the help of available literatures of Hooker (1894), Hundley and Chit KoKo (1987), Baker (1968), John Kress W. *et al* and Ceylon Vol. IV (M.D. Dassanayake, 1983).

Each collected specimen of the species were photographed, pressed, dried and mounted on the herbarium sheet. The taxonomic description of the collected species was presented in systematic position of angiosperm phylogeny group APG III.



**Figure (1) Maps of study areas**

### Results

#### Collection of plant samples

The three *Globba* species were collected from Rakhine State with the four *Globba* species were also collected from BagoYoma shown in Table (1).

**Table (1) *Globba* Species found in Rakhine State and BagoYoma**

No.	Scientific Name	Distribution
1.	<i>Globba arracanensis</i> Kurz.	Rakhine State
2	<i>G. orixensis</i> L.	Rakhine State
3	<i>G. marantina</i> L.	Rakhine State and BagoYoma
4	<i>G. pauciflora</i> Baker.	BagoYoma
5	<i>G. sessiliflora</i> Sims.	BagoYoma
6	<i>G. bulbifera</i> Roxb.	BagoYoma

#### ***Globba arracanensis* Kurz.**

#### **Morphological Characters**

*Globba arracanensis* are deciduous, rhizomatous herbs. Leaves are green up to 5 cm wide and 26 cm long, elliptic, tapering to a thread- like tip. The inflorescence is terminal on the leafy shoots, up to 20cm long, peduncle curved. The flowers are

lilac. Bracts are persistent, white- lilac. Bracteoles are persistent and light lilac. Calyx is lilac, tubular with three lobes. The petals are 3, white to light lilac, the corolla tube is white. Petals - like lateral staminodes of the flowers are white while the labellum is bifid, yellow and purple with yellow tips, one crossing over the other, the fertile stamen is one, the filament white, long, curved with inflected edges strongly curved in upper part, the style often becoming separated from it and forming a bow-string across the curvature and the anther light lilac with a darker almost purple tip. The pollen is white. The ovary is oblong, unilocular, parietal placentation. The style is filiform inserted within the grooved filament of the fertile stamen as seen in Figure (2).

Flowering and fruiting Time -June to November



**Habit**



**Inflorescence**



**Flower**

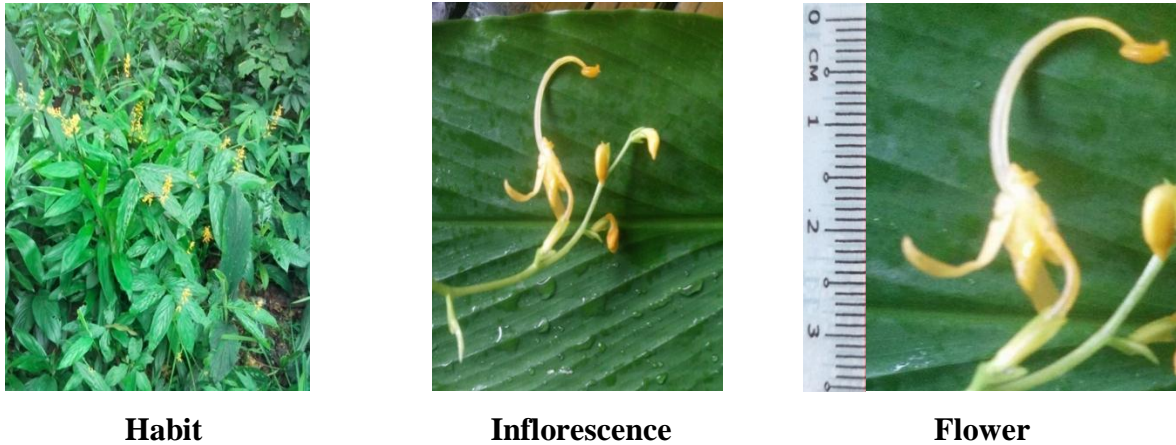
**Figure (2) Morphology of *Globba arracananensis* Kurz.**

### ***Globba orixensis* L.**

#### **Morphological Characters**

*Globba orixensis* L. is faintly aromatic herb, leafy shoot 30- 35 cm high. Leaves are simple, alternate, sub- sessile, cuneate at the base, ligulate. Inflorescence is terminal, erect. Flowers are yellow, bracteates, bracteolate. Calyx is 3 lobed, equal, glabrous, light green. Petals are 3, tube slender, lobe unequal, yellow. Lateral staminodes is linear, yellow. Labellum yellow, linear, tip bifid, connate to the filament in a slender tube above the staminodes. Fertile stamen is one, filament is long and slender, curved, anther is 2 celled. Ovary is unilocular, parietal placentation. Style is filiform, stigma exerted from the anther lobes as shown in Figure (3).

Flowering and fruiting Time -June to November



**Figure (3) Morphology of *Globba orixensis* L.**

***Globba bulbifera* Roxb.**

**Morphological Characters**

Perennial herbs, leafy shoot about 55 cm in height. Rhizomes cylindrical to subglobose, pale yellow. Leaf sheaths pale green, pubescent; ligules small, membranous, sheathing ligules; petioles green, pubescent; leaf blades ovate lanceolate, the bases attenuate, the margins entire, undulate, the tips aristate, midrib distinct, the upper surfaces dark green and glabrous, the lower pale green and minutely puberulous. Inflorescences cincinnus with many flowered, terminal on a leafy stem, bulblets globose, white, tuberculate. Flowers bright yellow; bracts ovate, pale yellow, persistent, glabrous; bracteoles ovate, pale yellow, glabrous; calyx 3, campanulate, yellow; corolla tubes slender, exerted from the calyx, pubescent; corolla lobes ovate, concave, yellow, glabrous. The lateral staminodes lanceolate, curved, yellow, attached to the corolla tube at the same level as the corolla lobes; the labellum deeply bifid, yellow, connate to the filament in a slender tube above the staminodes, auriculate at the base, red spotted at base. Fertile stamen one, the filament curved, the anther bear two wing-like appendages on each side. Ovary ovate, unilocular, parietal placentation, many ovules in the locule, pubescent; styles filiform; inserted within the grooved filament of the fertile stamen, the stigmas funnel-shaped. Fruits capsule as shown in Figure (4).

Flowering and fruiting Time - June to November

**Habit****Inflorescence****Flower****Figure (4) Morphology of *Globba bulbifera* Roxb.*****Globba marantina* L.****Morphological Characters**

Perennial herbs, leafy shoot about 58 cm in height. Rhizomes cylindrical, pale yellow. Leaf sheaths whitish green to reddish purple at young, dark green at maturity, pubescent; ligules small, green, pubescent; petioles very short, green, glabrous; leaf blades oblong lanceolate, the base cuneate, the margins entire, undulate, hairy, the tips acuminate, upper surfaces glabrous and the lower pubescent. Inflorescences spike, terminal on the leafy stem; peduncles, glabrous. Flowers yellow, sessile; bracts ovate, concave, the tips acute, green; bulbils ovoid; calyx 3, dentate, tubular, pale green; corolla tubes pale yellow, pubescent; corolla lobes boat-shaped, yellow, glabrous. The lateral staminodes oblong, yellow, curved; the labellum yellow, deeply bifid, obovate-oblong, connate to the filament in a slender tube above the staminodes. Fertile stamen one, the filament curved, the anther bears two wing-like appendages on each side. Ovary ovate, unilocular, parietal placentation, many ovules in the locule, glabrous; the styles filiform; inserted within the grooved filament of the fertile stamen, the stigmas funnel-shaped. Fruits capsule, ellipsoid as shown in Figure (5).

Flowering and fruiting Time -June to November



**Figure (5) Morphology of *Globba marantina* L.**

***Globba pauciflora* Baker.**

**Morphological Characters**

Perennial herbs, leafy shoot about 30-40 cm in height. Rhizomes cylindrical, pale yellow. Leaf sheaths green, glabrous; ligules small, green, membranous, glabrous, leaf blades elliptic, the bases rounded, the margins entire, undulate, the tips aristate, both surfaces glabrous. Inflorescences raceme, terminal on the leafy shoot; peduncles green, glabrous. Flowers bright yellow; bracts ovate-lanceolate, green, glabrous; bracteoles lanceolate, green, glabrous; pedicles green, very short; bulbils absent, white; calyx 3, campanulate, pale green, glabrous; corolla tubes pale yellow, pubescent; corolla lobes ovate, concave, yellow, glabrous. The lateral staminodes lanceolate, curved, yellow; the labellum deeply bifid, yellow, connate to the filament in a slender tube above the staminodes, auriculate at the base, red spotted at base. Fertile stamen one, the filament curved, the anthers bear two wing-like appendages on each side. Ovary ovate, unilocular, parietal placentation, many ovules in the locule, pubescent; styles filiform; inserted within the grooved filament of the fertile stamen, the stigmas funnel-shaped. Fruits oblong, green, smooth as shown in Figure (6).

Flowering and fruiting Time -June to November

**Habit****Inflorescence****Fruit****Figure (6) Morphology of *Globba pauciflora* Baker.*****Globba sessiliflora* Sims.****Morphological Characters**

Perennial herbs, leafy shoot slender, about 70 cm in height. Rhizomes small, white, cylindrical. Leaf sheaths whitish green to reddish green, sparsely pubescent; ligules bipartite, membranous, densely pubescent; petioles absent; leaf blades oblong-lanceolate, the base cuneate, the margins entire, the tips acuminate, upper surfaces sparsely pubescent, lower densely pubescent. Inflorescences terminal raceme, erect, many flowered. Flowers bright yellow, pedicellate, bracts ovate, greenish yellow; bulbils oblong, white, arise from the axils of bract; calyx 3, truncate, greenish to yellowish green; pubescent; corolla tubes yellow, densely pubescent; corolla lobes concave, lower middle portion minutely pubescent. The lateral staminodes linear, tips acuminate, yellow, outer surface pubescent; the labellum yellow, linear, tips bifid, connate to the filament in a slender tube above the staminodes. Fertile stamen one, filament slender, white, the anthers without appendages. Ovary globose, unilocular, parietal placentation, many ovules in the locule, the styles filiform, exerted from the anther lobes, the stigmas hairy. Fruits globose to ovoid, slightly warted. Seeds ovoid, hairy as shown in Figure (7).

Flowering and fruiting Time -June to November



**Habit****Inflorescence****Flower****Figure (7) Morphology of *Globba sessiliflora* Sims.**

### Comparative Study of *Globba* in Rakhine State and Bago Yoma

The different characters of habit, leaf, bract and bracteole, flower and appendage of six *Globba* species were compared in Table (2).

**Table (2) Comparative Study of *Globba* in Rakhine State and Bago Yoma**

No	Scientific Name	Habit	Leaf	Bracts and Bracteole	Flower	Appendage
1.	<i>Globba arracanensis</i> Kurz.	- grown on sedimental rock	Elliptic	Lilac	Lilac	- without appendage
2	<i>G. orixensis</i> L.	- grown in moist soil	Oblong to broadly lanceolate	Yellow	Yellow	- without appendage
3	<i>G. marantina</i> L.	- grown in moist soil	Oblong	Green	Yellow	- with appendage
4	<i>G. pauciflora</i> Baker.	- grown in moist soil	Elliptic	Yellow	Yellow	- With appendage
5	<i>G. sessiliflora</i> Sims.	- grown in moist soil	Oblong to lanceolate	Yellow	Yellow	- with appendage
6	<i>G. bulbifera</i> Roxb.	- grown in moist soil	Ovate	Yellow	Orange Yellow	- with appendage

### Discussion and Conclusion

The genus *Globba* is easily distinguished by having flower with lip joined to the stamen and long exerted, curve stamen. The anther with one or two triangular appendages, ovary one locule, parietal placentation.

Flower are pale yellow or bright yellow, bracts and bracteoles are green of *Globba sessiliflora* Sims., *G. bulbifera* Roxb., *G. marantina* L., *G. Pauciflora* Baker. and *G. orixensis* L. Bulbils are present as in *G. marantina* L. *G. sessiliflora* Sims. and *G. bulbifera* Roxb., anther yellow with appendages as in *G. marantina* L. *G. Pauciflora* Baker. and *G. bulbifera* Roxb. These characters are in agreement with the statements of (Endress P. K. (1994) Takano A., Okada H. (2003).

The four *Globba* species from BagoYoma and the three species from Rahine State were collected in this research. Among collected seven species, *Globba arracanensis* Kurz. was only found in Rakhine State.

*Globba arracanensis* Kurz. grow on slope of clastic sedimental rock composed of rock fragments that were cemented by silicate minerals in Rakhine State. Flowers are lilac. Bracts and bracteoles are light lilac. Anther lilac without appendages. These character are agreement with the statement of Kurz (1869).

In conclusion, *G. arracanensis* Kurz. was rare species that was found in Kolodone River villey of Arracan (now called Rakhine) State in Myanmar reported by Kurz in 1869. Now, this species was found in some places of Ponnagyun, YathaeTaung and Pauk Taw township. Although *Globba arracanensis* Kurz. is rare species and it is now known not to be extinct but this threaten species should be conserved due to the rapid degradation of the forest and natural habitats in Rakhine State. So this species will be needed to conserve under threat in this region.

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