The present work deals with 10 taxa (Nine species and one variety) of *Phlogacanthus* recorded to be occurring in Assam with their nomenclatural status and distribution within the state.

**MATERIALS AND METHODS**

Extensive field work has been carried out during 2014-2016 to document the species of *Phlogacanthus* Nees occurring in different parts of Assam. The collected specimens were processed into mounted herbarium sheets following standard herbarium techniques [15]. Collected specimens were also introduced into Botanical Garden, Botany Department, Gauhati University. Using relevant literature [16], critical examination and scrutiny of specimens deposited in ASSAM (BSI, Eastern Regional Circle Shillong), K (Royal Botanic Gardens Kew) and Jstor global plants the collected specimens were identified. The specimens were deposited in the Herbarium of the Department of Botany, Gauhati University (GUBH). Distributional status of the identified species in the world and India were recorded from literature. Uses of different species have been documented during field work from the local people. The local names of the species in the states other than Assam have been recorded from literature and provided using abbreviations Ass., G, K, Kh and DI against Assamese, Garo, Karbi, Khasi and Dimasa respectively.
RESULTS AND DISCUSSION


Members of the genus Phlogacanthus are tall herbs, shrubs and small trees. Stem stout, quadrangular, glabrous, lower portions wooly, puberulous upwards, nodes swollen and flat. The leaves of Phlogacanthus are opposite decussate, entire, glabrous or obscurely crenate, acuminate at both ends. The florets borne in terminal thyrsoid dense panicles, rarely in axillary racemes or cymes, showy, orange, red, pink or yellow, bracteate, bracteolate, complete, zygomorphic, hermaphrodite, pentamorous, hypogynous; sepals 5, gamosepalous; corolla tubular, curved; petals 5, gamopetalous, valvate, 2/3 bilabiate, imbricate in bud. Stamens 2, polyandrous, epipetalous, filaments hairy at the base, sometimes with two small staminodes; anthers 2-celled, muticous, glabrous, dorsifixed. Ovary syncarpous, bilocular, superior, ovules 5-8 in each cell, placation axis, an annular disc is present below the ovary; style long, filiform; stigma bifid. Fruit capsule, elongate, sub-tetragonous, many seeded from the base. Seeds lenticular, ovate in outline, glabrous or densely shortly hairy.

ENUMERATION

Key to the species:

1a. Inflorescence of short or long axillary cymes:

9a. Inflorescence long ca. 11-15 cm; bracts 3, green in colour...........P. thysiflorus

9b. Inflorescence short ca. 4.5-6.8 cm; bracts 2, dark brown in colour...............P. pubinervius

1b. Inflorescence of terminal spikes or thyrsoid panicles:

2a. Corolla tube widened upwards:

3a. Inflorescence more than 10 cm long; corolla orange-brown or dark-red:

4a. Corolla orange-brown, bracteoles present..............P. parviflorus

4b. Corolla dark-red, bracteoles absent..............P. gomezii

3b. Inflorescence less than 10 cm long; corolla yellowish-orange, purplish-pink or white:

5a. Corolla ca. 3-3.2 cm long, yellowish orange, seeds 2.5-2.8 cm long...........P. tubiflorus

5b. Corolla ca. 1.2-2 cm long, purplish-pink or white, seeds 1.9-3 cm long

6a. Corolla purplish pink, lateral nerves 7-9............P. quadrangularis

6b. Corolla white, lateral nerves 8-10.....................P. guttatus

2b. Corolla tube not widened upwards:

7a. Corolla less than 2 cm long; only stigma tip is curved............P. gomezii

7b. Corolla more than 2 cm long; whole gynoecium is curved

8a. Epicalyx 3, staminodes 2, gynoecium white.......P. curviflorus var. curviflorus

8b. Epicalyx 2, staminodes absent, gynoecium pink. P. curviflorus var. menchanensis

The present work records the occurrence of nine species and one variety of Phlogacanthus from different parts of Assam.


Type: Bangladesh, Mt. Sillet, Wallich, N., # 2429 a (M 0186719, E 00273556); Thailand, Siam, Hosseus, C.C., #305a, 31.12.1904 (M 0168711)

Local name: Kola bahak, Dhapat tita (Ass); Aluso (DI); Tew-phot-saw (Kh); Kham-chhit (G).

Shrubs large up to 4-5 m high; stems woody and stout, glabrous, puberulous upwards, nodes smooth, slightly pubescent; leaves 25-49.4 x 13-21.5 cm, obovate, apex acute, narrowed into petiole at the base, lateral nerves 10-12 pairs on each side, primary veins more prominent on the abaxial surface. Inflorescence terminal, 12-15 cm x 5-6 cm, short peduncled; bract 1, linear, 0.2 cm, bracteoles absent. Calyx 5 lobed, 0.4-0.5 cm; epicalyx 0.3-0.4 cm. Corolla ca. 2.8-3 cm long, tubular, brick red; stamina 4, glabrous, 2 fertile, 2 rudimentary. Gynoecium 2.4-2.5 cm long, stigma and style white in colour, ovary green. Capsule linear, elongate; seeds many, compressed.


Distribution: World: Bangladesh, India, Myanmar; India: North-east.

Occurrence: Roadsides and as forest undergrowth.

Specimen examined:


Type: Bangladesh, Sillet, s. coll., #7170, K000950023.

Local name: Banaria tita phul / Moupia (Ass), Nimso pechok, Jok an ke-er (Karbi).
Shrubs up to 3m high; stem woody, glabrous, quadrangular. Leaves elliptic, lanceolate, acuminate, 23-32 x 9-10 cm, narrowed at base; lateral nerves 10-11 pairs. Inflorescence terminal thyrsed, villous, 10-14 x 9-10 cm. Calyx villous, 0.9-1 cm; bracts 2, 1-1.3 cm; bracteoles 4, 0.2-0.3 cm. Corolla dark red, 1.6-1.8 cm, tubular, widened upwards, curved. Stamens glabrous. Gynoecium 3 cm, ovary glabrous.

**Frs.** Jan-March. **Fr.** March-May.

### Distribution: World
- Bangladesh (Sillet), India; **India:** Assam, Meghalaya, Mizoram. **Occurrence:** As forest undergrowth

**Specimen examined:** India, Assam, Kamrup District, Amsang Wildlife Sanctuary, January 30, 2014, **B. Dutta**, 007,008,009.


**Type:** Bangladesh, Mount Silhet, Wallich, N., #2431, 1830, (E00273555, P00719589).

**Local name:** Not known.

Shrubs up to 1-2m high, pubescent when young; stem thin; leaves elliptic or oblanceolate, 7-13 x 4-5 cm, base cuneate, apex acuminate, lateral nerves 8-10, petiole 2.5-3.2 cm. Inflorescence terminal, not very dense, 7-9.5 cm; bracts and bracteoles absent. Calyx pubescent, 1-1.2 cm. Corolla dark red; stamens 2, exserted. Gynoecium deep red, 2.3-2.5 cm; ovary glabrous.

**Frs.** Dec-Feb. **Fr.** March-April

### Distribution: World
- Bhutan, China, India, Malaysia; **India:** Arunachal Pradesh, Assam, Meghalaya, Mizoram and Tripura. **Occurrence:** As forest undergrowth and in open forest of low hills.

**Specimen examined:** India, Assam, Karbi Anglong District, Ulukunchi, March 3, 2016, **B. Dutta**, 051, 052.


**Type:** India, Assam, s. coll., # s.n., 1829, K 000950016, K 000950014; India, upper Assam, Jenkins, F., #s.n., K 000950015.

**Local name:** Baheka (Ass)

Shrubs up to 4-5m high; stem stout, quadrangular, glabrous, puberulous upwards; leaves broad, large, apex acute-acuminate, 30-34 x 10-15 cm, petiole 3.3-3.5 cm, lateral nerves 11-13 pairs. Inflorescence axillary raceme, 11-15 x 2.6-3.2 cm; bracts 3, 2 short, 1.2-1.3 cm and 1 long, 1.5-1.7 cm; bracteoles absent. Calyx 1.2-1.4 cm, linear lanceolate. Corolla pubescent, yellow, 2.8-3 cm; stamens 2, glabrous; anthers short, exserted. Gynoecium 2.9-3.1 cm, ovary glabrous. Seeds small, 2.5-2.8 cm.

**Frs.** Dec-Feb. **Fr.** Feb-March.

### Distribution: World
- Bhutan, China, India, Malaysia; **India:** Assam, Meghalaya, Mizoram. **Occurrence:** In open forest of low hills.

**Specimen examined:** India, Assam, Karbi Anglong district, Hamren, January 25, 2016, **B. Dutta**, 049, 050.


**Type:** Smith, J.C., #s.n., K000950020

**Local name:** Tita phool, tita bahak, Ram bahak (Ass); Jok-an, Tadongmiow (K); Elliot (G); Dieng-soh-kajut, Ja-boit (Kh).

Shrubs up to 2 m high; stem erect, long, glabrous; leaves 13-24 x 7-9 cm, elliptic, lanceolate, acute; lateral nerves 9-10 pairs. Inflorescence 10-12 x 4-5cm, terminal, pubescent; bracts 3, 1.3-1.4 cm, linear; bracteoles absent. Calyx 0.4-0.6 cm, puberulous. Corolla orange brown, 2.4-2.4 cm, tubular, closely villous; stamens 2, exserted, glabrous. Gynoecium pinkish white, 2.5-2.6 cm; ovary glabrous. Seeds 1.9-2 cm, glabrous.


**Distribution:** World: Bhutan, India; India: North-east and West Bengal

**Occurrence:** Roadside in dry areas, as forest undergrowth, also grown as ornamental plants.


**Type:** India, Goalpara, Buchanan-Hamilton, F., #wall. cat. n. 2428, 12.11.1808, GZU000251442.

**Local name:** Tita phool, Bhataitita (Ass); Alubabui (DI); Jok-anke-et, Nimsopechok, Pichok lok, Kabrotudong miow (K); Som rongtek (Kh).

Shrubs up to 3-4m high; stems obscurely angled. Leaves oblong-lanceolate, 22-30 x 8-9 cm, base cuneate, apex acuminate, pubescent beneath; lateral nerves 8-10 pairs on each side. Inflorescence, terminal thyre, 13-16 x 2-3 cm, bracts 3, 1.1-1.4 cm; bracteoles absent. Calyx triangular lanceolate, 1.1-1.2 cm. Corolla yellowish orange, 3-3.2 cm long, widened upwards, shortly 2-lipped; stamens 2, glabrous. Gynoecium whitish green, 2.2-2.4 cm, ovary glabrous. Seeds long, 2.5-2.8 cm, compressed, glabrous.

**Specimen examined:** India, Assam, Kamrup (Rural), Hajim, January 30, 2014, B. Dutta, 027, 028, 029; Karbi Anglong District, Diphu, January 24, 2015, B. Dutta, 037, 039.


**Local name:** Baheka (Ass).

Shrubs up to 1m; stem thin. Leaves 13-15 x 6-7 cm, elliptic, acuminate, lanceolate; lateral nerves 7-9 pairs. Inflorescence 3.5-4 x 1.1-1.4 cm, terminal; bracts 2, 0.2-0.3 cm, bracteoles absent. Calyx 0.4-0.6 cm, puberulous. Corolla inflated at the mouth, widened upwards, purplish pink, 1.2-1.3 cm, pubescent. Gynoecium light pink, 1-1.1 cm. Seeds 1.9-2 cm, glabrous.

**Specimen examined:** India, Assam, Karbi Anglong District, Lahorijan, March 7, 2015, B. Dutta, 038, 040; India, Assam, Jorhat District, Tarajan, January 17, 2016, B. Dutta, 043, 044, 045; India, Assam, Sivasagar District, Geleki, January 19, 2016, B. Dutta, 046, 047.

**Flrs.** Jan- March. **Fr.** March-May

**Distribution:** World: Bangladesh, Bhutan, India and West Bengal; India: Assam, Darjeeling and Meghalaya

**Occurrence:** As forest undergrowth.

**Specimen examined:** India, Assam, Karbi Anglong District, Lahorijan, March 7, 2015, B. Dutta, 041, 042.

**CONCLUSION**

In the present work 10 taxa has been recorded from different parts of Assam. Out of these, *P. thyrsiflorus* is the most common which is found in almost all the districts of the state. Although *P. curviflorus*, *P. gomezii*, *P. pubinervius* and *P. tubiflorus* are used as dietary supplement and also as medicine by different ethnic communities of the region yet the most commonly used species is *P. thyrsiflorus*. As the members of the genus is medicinal and cures a number of diseases, so it is also sold locally in the hilly districts of Karbi-anglong, North Cachar hills, Barak valley and in the some parts of Meghalaya. As the members of the genus are endemic so *ex-situ* conservation and mass propagation can be taken up for their perpetuation. Introduction in botanical gardens will also help in the conservation of this genus.

**ACKNOWLEDGMENT**

Authors are thankful to the UGC for providing financial assistance in the form of SAP-DRS-I for carrying out the work successfully.
Table 1: Ethnobotanical uses of the members of *Phlogacanthus* in Assam

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the species</th>
<th>Parts Used</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Phlogacanthus curviflorus</em> var. <em>curviflorus</em> (Wall.) Nees</td>
<td>Whole Plant</td>
<td>Used in jaundice, skin infection, fever, sore throat and as leafy vegetable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stem</td>
<td>Yields red dye used for dyeing yarn.</td>
</tr>
<tr>
<td>2.</td>
<td><em>P. curviflorus</em> var. <em>menchanensis</em> Barnali Dutta &amp; S. K. Borthakur</td>
<td>Leaves and flowers</td>
<td>Cooked and eaten as vegetable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaves</td>
<td>Decoction is used to cure muscular pain.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whole plant</td>
<td>Used in the treatment of cold, fever, sore throat, swellings and bruises.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roots</td>
<td>Used in treatment of malaria.</td>
</tr>
<tr>
<td>3.</td>
<td><em>P. gomezii</em> (Nees) J. R. I. Wood</td>
<td>Inflorescence</td>
<td>Fried boiled or baked and cooked with fish.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaves</td>
<td>Used in treatment of stomach pain of female post child birth</td>
</tr>
<tr>
<td>4.</td>
<td><em>P. guttatus</em> Nees</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td><em>P. jenkinsii</em> C. B. Clarke</td>
<td>Leaves</td>
<td>Decoction of leaves is used in spleen and liver diseases.</td>
</tr>
<tr>
<td>7.</td>
<td><em>P. pubinervius</em> T. Anderson</td>
<td>Flowers</td>
<td>Cooked with rice to regulate the blood pressure and normal functioning of the body.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaves</td>
<td>Dried leaves are eaten to cure dysentery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decoction is used to cure malaria.</td>
</tr>
<tr>
<td>8.</td>
<td><em>P. thyrsiflorus</em> (Roxb. ex Hadw.) Mabb.</td>
<td>Inflorescence</td>
<td>Boiled or baked with dried fish, meat and eaten as chutney; used to relieve stomach ache.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whole plant</td>
<td>Used in fever, skin disease, abdominal tumour, chronic bronchitis, asthma, dysentery, haemoptysis, painful swellings, neuralgia, scabies, malaria and whooping cough.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whole plant</td>
<td>Used in Bathou Puja by Bodo people.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fruit and Leaf</td>
<td>Ash is used in fever by Jaintia tribe of Meghalaya and Karbi tribe of Assam.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flowers</td>
<td>Antidote to pox; prevents skin diseases like scabies, sore; used in jaundice.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aerial portion</td>
<td>Curry is eaten orally to cure allergy.</td>
</tr>
<tr>
<td>9.</td>
<td><em>P. tubiflorus</em> Nees</td>
<td>Whole plant</td>
<td>Used in Chojun (a ritual of the Karbi people).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flowers</td>
<td>Boiled or baked with alkali solution and eaten with fish; used as vegetable in intestinal worm, rheumatism, cold and cough.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaves</td>
<td>Used to wash hair to destroy head louse and nit and as detergent to wash clothes and hair; powder is smoked in asthama.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bark</td>
<td>Decoction given in asthama.</td>
</tr>
<tr>
<td>10.</td>
<td><em>P. quadrangularis</em> (Hook.)</td>
<td>Flowers</td>
<td>Tea tribe of Upper Assam uses it as vegetable.</td>
</tr>
</tbody>
</table>
Fig 1: Habit of Phlogacanthus spp.
A. Phlogacanthus curviflorus var. curviflorus, B. P. curviflorus var. menchanensis, C. P. gomezii,
D. P. guttatus, E. P. jenkinsii, F. P. parviflorus, G. P. pubinervius,
H. P. thyrsiflorus, I. P. tubiflorus, J. P. quadrangularis

REFERENCES

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