

Taxonomic Observations on Family *Bignoniaceae* of Bhopal, Madhya Pradesh

Vipin Soni^{*1}, Madhuri Modak², Manisha Nema³

Department of Botany, Govt. Motilal Vigyan Mahavidyalaya, Bhopal, (M. P.), India
vipin.soni21@yahoo.com

Abstract - The present paper aimed to study the phytodiversity of family Bignoniaceae in Bhopal of Madhya Pradesh, India. A total of 11 species belonging to 10 genera were recorded from Bhopal, out of these 7 species belonging to 6 genera are newly reported. Present study dealt with the artificial key to identify various genera, their taxonomic account and analysis of species under different headings like, dominante, rare and new reported species. The species like *Cydista aequinoctialis* were found to be the dominant species. The presence of the following species like *Dolichandrone falcata*, *Heterophragma adenophyllum*, and *Oroxylum indicum* indicates the presence of wilderness within the study area.

Keywords- Phytodiversity; Bignoniaceae; Bhopal; Madhya Pradesh

I INTRODUCTION

The study area selected is Bhopal, the capital of the Indian State Madhya Pradesh. Bhopal is also known as “City of lakes” for its various natural as well as artificial lakes. It lies between 23-10N’ to 23°-20N’, 77-10E’ to 77°-30’E. It is located in the central part of India and just north of the upper limit of the Vindhya Mountain ranges. Bhopal district is endowed with rich and diverse forest resources. The total forest cover in Bhopal is 43719.31 hectares. The city is rich in natural vegetation, including many gardens, manmade forests and other protected areas.

The family *Bignoniaceae* is characterized by woody stem, opposite, compound leaves and zygomorphic flowers. The family is comprised of about 112 genera and 725 species, usually distributed in the tropical and subtropical parts of world (Mudgal et al. 1997). In India, the family is represented by 15 genera and 40 species, mostly occurring in western and southern parts whereas, a few in Himalayas (Chakravarty, 1982). Mudgal et al. (1997) recorded 17 genera with 18 species in Madhya Pradesh. Oommachan (1977) reported 10 genera and 11 species in Bhopal. Members of this family are usually found as ornamental plants for their large and often colorful flowers. The city of lake, can boast of as one of the green city of Indian states. This has been possible because of the public awareness and law enforcing agencies and those responsible for making the area eco-friendly. Not only the existing flora is conserved but every new Year new species of plants are added to increase the green cover. There has been an indiscriminate deforestation at various part of this state owing to the urbanization and industrialization activities. But for the last few decades various agencies have taken up the afforestation activities in open areas. The present investigation is an attempt to study of phytodiversity of the Family Bignoniaceae in Bhopal.

II METHODOLOGY

The present work is mainly based on the field studies. Surveys were carried out during May 2009 to April 2010. For each species, 2-3 voucher specimens were collected, along with certain field notes. All the collected specimens were brought to laboratory for processing, poisoning and preservation. Specimens were identified with the help of available floras and consultation of other relevant literature. For confirmation of identification, these specimens were matched with herbarium specimens at Botanical survey of India, Allahabad.

III RESULT

Taxonomically, a total of 18 species belonging to 16 genera were collected and identified in Bhopal. In present study 7 species under 6 genera of family Bignoniaceae are newly recorded in the target area. Among these, 11 are large trees, 2 are small trees or can be said large shrubs and rest 5 are climbers. Table & Figure 1 shows list of newly reported species from Bhopal and Table II shows list of tree species.

TABLE I NEW REPORTED SPECIES FROM BHOPAL

S. No.	Plant species
1.	<i>Dolichandrone falcata</i> (Wall. Ex DC)Seem.
2.	<i>Hetropharagma adenophyllum</i> (Wall.)Seem.
3.	<i>Markhamia lutea</i> (Benth.) K. Schum
4.	<i>Oroxylum indicum</i> (L.)Venten
5.	<i>Tabebuia alba</i> (Cham.)Sandw
6.	<i>Tabebuia caraiba</i> (Mart.)Bureau
7.	<i>Campsis radicans</i> (Linn.)Seem.

TABLE II DEPICTING TREE SPECIES OF FAMILY BIGNONIACEAE

S. No	Plant species
1.	<i>Crescentia cujete</i> L
2.	<i>Jacaranda mimosaeifolia</i> D. Don.
3.	<i>Dolichandrone falcata</i> (Wall. Ex DC)Seem.
4.	<i>Hetropharagma adenophyllum</i> (Wall.)Seem.
5.	<i>Kigelia africana</i> DC.
6.	<i>Markhamia lutea</i> (Benth.) K. Schum
7.	<i>Oroxylum indicum</i> (L.)Venten
8.	<i>Spathodea campanulata</i> P.
9.	<i>Tabebuia alba</i> (Cham.)Sandw
10.	<i>Tabebuia caraiba</i> (Mart.)Bureau
11.	<i>Tabebuia rosea</i> (L.) Hemsl

Most of the species are found planted in several sites of study area. Some species were found wild like *Dolichandrone falcata*, *Heterophragma adenophyllum*, and *Oroxylum indicum*. The species widely distributed in study area are *Jacaranda mimosaeifolia*, *Kigelia pinnata*, *Millingtonia hortensis*, *Spathodea campanulata*, *Tabebuia aurea* and *Tecoma stans*. The detailed of five dominant species is given in Table IV. Some species were found rare (Table III).

TABLE III RARE SPECIES OF FAMILY BIGNONIACEAE

S. No.	Plant species
1.	<i>Hetropharagma adenophyllum</i> (Wall.)Seem.
2.	<i>Oroxylum indicum</i> (L.)Venten
3.	<i>Macfadyena unguis-cati</i> L.
4.	<i>Tabebuia alba</i> (Cham.)Sandw

TABLE IV FIVE DOMINANT SPECIES OF FAMILY BIGNONIACEAE

S. No.	Plant species
1.	<i>Cydista aequinoctialis</i> (L.).
2.	<i>Kigelia africana</i> DC
3.	<i>Pyrostegia venusta</i> Ker. –Gawl.
4.	<i>Spathodea campanulata</i> P.
5.	<i>Tecoma stans</i> (L.) Juss.

*Dolichadrone falcate* (Wallich ex DC.)*Oroxylum indicum* Vent.*Hetropharagma adenophyllum* Seem.*Tabebuia alba* (Cham.) Sandw*Markhamia lutea* (Benth.) K. Schum.*Tabebuia caraiba* (Mart.) Bureau

Fig. 1 Reported new species of family bignoniaceae

KEY TO GENERA

1A Climbing shrubs or vines:

2A Terminal leaflets foliaceous, flower orange or pink-....**Campsis**

2B Terminal leaflets modified into tendrils:

3A Tendrils simple; corolla purple or red.....

Cydista

3B Tendril-3 fid:

4A Tendril non hooked, panicles terminal, corolla orange..**Pyrostegia**4B Tendril hooked, panicles axillary; corolla yellow.....**Macfadyena**

1B Erect shrubs or trees:

5A Large shrubs or small trees:

6A Cauliflory, fruit a large berry **Crescentia**

6B Acaliflory, fruit capsule, leaflets serrate:

7A Corolla orange-red, infundibuliform..... **Tecomaria**

7B Corolla bright yellow, campanulate..... **Tecoma**

5B Large trees:

8A Leaves palmately, 5-foliolate, corolla **Tabebuia**

8B Leaves pinnately compound

9A Leaves 1-pinnately compound:

10A Calyx spathaceous :

11A Capsule straight, lanceolate, corolla crimson..... **Spathodea**

11 B Capsule compressed, falcate, curved:

12A Corolla pure white, invariably crimped..... **Dolichandrone**

12B Corolla yellow, orange lines at the mouth... .. **Markhamia**

10 B Calyx not spathaceous:

13A Inflorescence drooping, capsule straight..... **Kigelia**

13B Inflorescence erect, capsule spirally coiled.... **Heterophragma**

9B Leaves 2-3 pinnate:

14A Perfect stamen 5, leaves 2 pinnate, corolla maroon . **Oroxylum**

14B Perfect stame

15A Leaves 2 pinnate, corolla personate..... **Jacaranda**

15B Leaves 3 pinnate, corolla narrow, tubular... .. **Millingtonia**

BRIEF DESCRIPTION OF THE RECORDED SPECIES.

1. **Campsis radicans** (Linn.) Seem. **Syn.** *Bagnonia radicans*, *Tecoma radicans*

A spreading shrub; roots arising from the branches; tendrils absent; leaflets 9-11, ovate-oblong, acuminate, serrate; flowers orange-scarlet, in terminal, drooping corymbs; capsules cylindrical, oblong, beaked; seed winged.

Common name: Trumpet creeper. **Fl. & Fr.** April-June
Location: Arera colony

2. **Crescentia cujete** L. **Syn.** *Crescentia calycina*

Small tree; leaves simple or 3-foliolate, fascicled, petiole winged; flowers solitary, developing on mature woody stem (Cauliflory); calyx glabrous; corolla with combination of green, purple, red and yellow with dull purple lines, tubular, fleshy, lobes deltoid; berries globose and large.

Common name: Kalabach tree **Fl. & Fr.** March-July
Location: Ekant Park & VIP Road

3. **Cydista aequinoctialis** (L.) Miers **Syn.** *Mansoa alliacea*, *Bignonia aequinoctialis*

Climbing shrub. Leaves 2-foliolate, terminal leaflet modified into simple tendril, ovate to elliptic-lanceolate, shining green, obtusely acuminate; flower in terminal or axillary panicle; calyx cupular, truncate or shallowly 5-lobed; corolla purple, rose or red with maroon lines, glabrous; disc absent; capsule linear, rounded-tipped. **Common name:** Garlic vine. **Fl. & Fr.** Nov-March **Location:** Public & private gardens in Shivaji Ngr

4. **Dolichandrone falcata** Seem. **Syn.** *Bignonia atrovirens*, *Spathodea falcata*

Deciduous tree, 6-8 m high; leaves opposite, uni-pinnate, leaflets 5-7; opposite, orbicular to obovate, cuneate or rounded at base with rather undulate margins, emarginated or rounded with short pubescence. Flowers in terminal, few-flowered racemes, pedicellate; calyx pubescent with short, stout mucron at the apex; corolla white with crisped, lobes obovate-oblong, undulate margins; stamens 4, included, anther cells oblong, parallel; capsules 30-40 cm long, falcately curved, acute, acuminate, green.

Common name: Medshingi **Fl. & Fr.** March-June
Location: Shahpura hills & on way to WALMI

5. **Heterophragma adenophyllum** Seem. **Syn.** *Fernandoa adenophyllum*

A medium-sized tree with a dense crown; leaves large, unipinnate, leaflets 5-7, broad elliptic; flowers large, yellowish-brown, rusty, wooly-tomentose, in terminal panicles; calyx campaulate, long, irregularly 3-5 lobed; corolla densely brown-tomentose outside; capsule cylindrical, 30-90 cm ribbed, usually twisted. **Common name:** Tree of domocles **Fl. & Fr.** Sept-Nov **Location:** Jail road.

6. **Jacaranda mimosaefolia** D. Don. **Syn.** *Jacaranda ovalifolia*

Trees 6-8 m high, decorative with a dense crown; leaves, small, pinnately compound, pinnae 20 pairs or less; leaflets many, acuminate, oblong to rhomboid, terminal one linear-lanceolate; flowers in lax, terminal panicles; calyx 5-toothed; corolla blue-violet. Capsules ovoid-orbicular, flat, woody. **Common name:** Blue Gulmohar **Fl. & Fr:** March-Oct
Location: Link Rd. No. 1 & Kamala park.

7. **Kigelia africana** DC. **Syn.** *Kigelia pinnata*, *Bignonia Africana*

Trees up 10-15 m high; leaves decussate or ternate, 20-50 cm long; leaflets 5-9, ovate-oblong to elliptic-ovate, acute or mucronate at apex, often oblique at base, entire; flowers in very long, drooping lax panicles as narrow, pendent racemes; calyx cupular, 2 lipped, greenish, glabrous; corolla dark wine-red, 5-10 cm long, throat wide; stamens 4; fruits shortly beaked, 25-30 cm long. **Common name:** The Sausage tree **Fl. & Fr.** Mar-Aug **Location:** Kolar Rd & M.P. Nagar

8. **Macfadyena unguis-cati** L. **Syn.** *Bignonia unguis-cati*, *Bignonia grcilis*

Extensively spreading climber; tendrils with 3 claw like curved arms; leaves very variable, 2-3 foliate; leaflets ovate-lanceolate, rounded at base, acute to acuminate or mucronate at apex; flowers in axillary panicles; calyx cupular, membranaceous; corolla bright yellow with orange lines at the throat; stamens 4. Capsules narrowly linear, flattened, with leathery valves.

Common name: Cate claw vine **Fl. & Fr.** Dec-May
Location: Rajbhavan campus

9. **Markhamia lutea** (Benth.) K. Schum. **Syn.** *Markhamia hildelbrandtii*, *Markhamia platycalyx*

An evergreen tree, 10-15 m high; leaves compound, leaflet up to 10 cm, 5-9, oblong, acuminate at apex, margins subserrate to serrate, glabrous, prominently nerved beneath; with 2 sub-orbicular, stipule-like leaflets at the base of the petiole; flowers bright yellow, in showy terminal clusters; calyx 2.5 cm long; corolla bright yellow; limbs 5 cm across; capsule brown, 30-60 cm long, linear, compressed, twisted at maturity. **Common name:** Nile tulipe tree. **Fl. & Fr:** Dec- April **Location:** Kamla Park and Char Imli

10. **Millingtonia hortensis** L. f. **Syn.** *Bignonia suberosa*

Handsome tree, 8-10 m high; leaves opposite, 40-50 cm long, 2-3 pinnate; leaflets ovate-lanceolate, acute at base, sinuate-crenate, acuminate, glabrous or minutely pubescent; flowers in corymbose-panicles, fragrant, white; calyx copular, teeth 5, ovate-obtuse, margins revolute; corolla white tubular;

stamens 4; ovary 1-celled, ovules many; capsules up to 30 cm long **Common name:** Indian cork tree **Fl. & Fr.** Dec-May **Location:** Ekant Park & University campus.

11. *Oroxylum indicum* Vent. **Syn.** *Bignonia indicum*, *Bignonia pentandra*

Tree, 10-15 m high, deciduous; leaves usually tufted towards twig ends, long petiole, 2-3 pinnate; pinnae opposite, leaflets 2-4 pairs base rounded or cordate, entire, acuminate, glabrous; flowers in racemes, fleshy, foetid; calyx latheary, oblong-campanulate, glabrous, dull violet; corolla deep maroon, 5-7 cm long; disk shallowly 5-lobed; stamens 5; ovary linear-oblong; capsule flat, pendent, 50-75 cm, tapering at both ends with woody valves. **Common name:** Indian trumpet flower tree **Fl. & Fr.** June-march **Location:** Ekant park

12. *Pyrostegia venusta* Ker. –Gawl. **Syn.** *Bignonia venusta*, *Pyrostegia ignea*

Extensively spreading, evergreen, woody climber. Leaves opposite, 1-pair of leaflets, ovate-lanceolate, or rounded or subcordate at base, entire, acuminate, shining green and glabrous above, pale and pubescent beneath; terminal leaflet ending in branched tendril; calyx cupular, truncate or obscurely toothed mouth; corolla bright orange or crimson, tube narrow in the lower half, widened upwards; stamens 4, exserted. **Common name:** Golden shower vine **Fl. & Fr.** Oct-Jan **Location:** Throughout the study area

13. *Spathodea campanulata* P. Beauv. **Syn.** *Spathodea nilotica*

Tree 8-10 m high; leaves odd-pinnate, opposite or in whorls of 3, 1-pinnate, leaflets 3-19, ovate-lanceolate or elliptic, rounded at base, entire, acuminate, glabrous above; flowers in erect, many flowered compact racemes; calyx leathery, dark-brown tomentose; corolla campanulate, orange-crimson; lobes undulate margined; stamens 4; capsule lanceolate, flat, narrowed at both ends, erect, glabrous, brownish-black. **Common name:** African tulip tree **Fl. & Fr.** Jan-May **Location:** Link Rd No. 1

14. *Tabebuia alba* (Cham.) Sandw **Syn.** *Handroanthus albus*, *Tecoma alba*

A large deciduous tree; leaves petiolate, opposite, digitately 4-5 foliate, leaflets up to 15 cm long, oblong-obovate, base rounded, entire, acute apex; inflorescence terminal panicles; flowers in clusters, tubular, lobes orbicular, obtuse, crisped, white, throat yellow, turning white. **Common name:** White trumpet tree **Fl.** Oct-Dec **Location:** Sofia Masjid

15. *Tabebuia caraiba* (Mart.) Bureau **Syn.** *Tabebuia aurea*, *Tabebuia argentea*.

A small deciduous tree. Leaves opposite, digitately 5-7 foliate, leaflets up to 15 cm long, elliptic-oblong, narrowed at both ends; flowers in terminal racemes, in clusters, almost covering the upper part of the branches; calyx cupular, shallow lobed; corolla 6 cm long, bright yellow; stamens 4; capsules woody. **Common name:** Golden trumpet tree. **Fl. & Fr.** Jan-March **Location:** MVM Campus.

16. *Tabebuia rosea* (L.) Hemsl **Syn.** *Tabebuia pentaphylla*, *Bignonia pentaphylla*

Tree, deciduous. Leaves digitately compound, leaflets 5, oblong-obovate, subsessile, base rounded to acute, margin

entire, apex acute; inflorescence terminal panicles; flowers in clusters, lobes orbicular, obtuse, crisped, slightly fragrant; calyx bilabiate; corolla rosy pink or lavender, throat yellow, turning white; stamens 4, anthers sagitate; fruits cylindric. **Common name:** Pink trumpet tree **Fl. & Fr:** Dec-March **Location:** VIP Road & Ekant Park

17. *Tecoma stans* (L.) Juss. **Syn.** *Bignonia stans*

Large shrub or small tree, 1.5-2.5 m high; leaves opposite, 1-pinnate; leaflets 5-13, lanceolate, narrowed at base, serrate, acuminate, glabrous above, minutely pubescent beneath; flowers often drooping, in large, terminal, few-flowered, corymbose, racemes; calyx tubular, campanulate; lobes triangular, acuminate, ciliated; corolla bright yellow, ovate-orbicular; stamen 4, included; capsules 10-16 cm, linear, flat, brown. **Common name:** Yellow trumpet tree. **Fl. & Fr.** Sept-Feb **Location:** MVM Campus

18. *Tecomaria capensis* (thunb.) Spach. **Syn.** *Bignonia capensis*, *Tecoma capensis*

A climbing or nearly erect, glabrous shrub; leaflets 5-9, broad ovate or elliptic-rhomboid, acute at apex, serrate; flowers in terminal racemes; calyx cupular; corolla orange-red, infundibuliform; disk cupular-pulvinate; stamens 4, exserted; capsules linear, 7 cm long. **Common name:** Cape honey suckle **Fl. & Fr.** July-Sept **Location:** MVM Garden

IV CONCLUSION

The present investigations, on members of family Bignoniaceae found in Bhopal, indicated the presences of additional 7 species belonging to 5 genera were added in 'Flora of Bhopal'. It is interesting to mention here, that *Tebeobua rosea* is the species recorded only from Bhopal in the state of Madhya Pradesh. As resulted above, trees are of great importance to people, not only economically and ecologically but also ornamentally and bio-aesthetically. Because trees meet the needs of humans, the primary objective of many forestation, biodiversity, ecodevelopment must be both to protect native tree growing areas from further destruction and to plan tree in large areas

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