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Taxonomic Study and Medicinal Uses of Verbenaceae Family of Rajshahi District, Bangladesh

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Abstract

Taxonomic study and medicinal uses of the family Verbenaceae of Rajshahi was carried out from July 2015 to June 2016. A total of 9 species under 9 genera belonging to the family Verbenaceae were collected and identified. For each species botanical name, local name, synonym, status of occurrence, habit, habitat, flowering and fruiting time, chromosome number, distribution, taxonomic description and traditional medicinal uses have been mentioned. Photographs of all species are presented. The medicinal data collected about these commonly used plant species were recorded, preserved and documented which revealed that they are quite effective remedies for different diseases such as fever, rheumatism, worm, ulcers, asthma, headache, ringworm, piles, diuretic, eczema, skin disease, bronchitis, stomachic, boils, menstrual disease, malaria, tetanus, wounds, burning sensation, jaundice, anemia, cough and leprosy. Thus a survey was carried out, to record the traditional health care remedies currently practiced by the local people.

Keywords: Verbenaceae; Taxonomy; Medicinal Uses; Rajshahi; Bangladesh.

1. Introduction

The family Verbenaceae of about 99 genera and 3151 species distributed chiefly in tropics and subtropics. About 22 genera and over 30 species have been reported from India. Some of the genera along with their number of approximately reported species and common names of some of them are Clerodendrum (400, glory-bower), Verbena (250, vervain), Vitex (250, chaste tree), Lippia (220, frogfruit), Lantana (150), Callicarpa (140, beauty-berry), Stachytarheta (100) and Tectona (3, teak) (Sharma, 2004).

Tectona grandis is the most important plant of this family and it supplies teak wood. The wood is very hard, durable and yellowish brown and requires good polish so that it is widely used in making furniture. Some like Lantana, Duranta, Clerodendron, etc. are garden plants or hedge plants. Callicarpa, Holmskioldia are ornamentals. Petrea volubilis has blossoms borne elegant wreath-like clusters and it is a Petrea. Verbena bipinnatifida is cultivated in garden beds. Caryoperis wallichiana is a garden herb with dense foliage and sweet scented flowers in dense axillary cymes. The warm leaves of Vitex negundo are applied for curing rheumatic swellings (Sambamurty, 2005). The family Verbenaceae consists of about 100 genera and 2600 species, mostly pan-tropical, a few are limited to temperate regions. In Bangladesh, this family is represented by 19 genera and 68 species (Ahmed et al., 2009).

Taxonomic position of the family Verbenaceae (Cronquist, 1981)

Division	: Magnoliophyta
Class	: Magnoliopsida
Subclass	: Asteridae
Order	: Lamiales
Family	: Verbenaceae

The importance of studying local floristic diversity and medicinal uses has been realized and carried out in Bangladesh by Anisuzzaman et al (2007), Ara et al (2011, 2013), Rahman et al (2006), Rahman et al (2007a, 2007b, 2007c), Rahman et al (2008a, 2008b, 2008c, 2008d), Rahman et al (2011, 2012, 2013a, 2013b, 2013c, 2013d, 2013e, 2013f), Rahman and Akter (2013), Rahman and Khanom (2013), Rahman (2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2013i, 2013j, 2013k, 2013l, 2013m, 2013n, 2013o), Rahman (2014a, 2014b, 2014c, 2014d), Rahman and Debnath (2014a, 2014b), Rahman and Keya (2014a, 2014b), Rahman and Gulshana (2014), Rahman and Rahman (2014), Rahman and Rogoni Gondha (2014), Rahman et al (2014a, 2014b, 2014c), Uddin and Rahman (1999) and Uddin et al (2014). The main objectives of this work will be detailed study on the taxonomic and medicinal aspects of the family Verbenaceae occurring Rajshahi, Bangladesh.

2. Materials and Methods

Study Area: Rajshahi district is a district in north-western Bangladesh. It is a part of the Rajshahi division. The metropolitan city of Rajshahi is in Rajshahi district. The Rajshahi district is bounded by Naogaon district to the north, Natore district to the east, and Chapai Nawabganj district and the river Padma to the south. The Rajshahi district has a sub-tropical monsoon climate, typical of Bangladesh, which falls within a low rainfall zone of the country. 75 percent rainfall occurs during June-September. The annual rainfall is 1350 mm. Temperature of the area is low in January varies from 9.0°C to 14.1°C. From February an increasing trend of temperature is found up to April and thereafter temperature start to decline. In April temperature varies from 22.6°C to 36.9°C. The mean relative humidity is found to be low in March (65%) and high in July-September (88-89%) (BBS, 2009).

Methods of the Study: Taxonomic investigation on the family Verbenaceae growing throughout the Rajshahi was carried out from July 2015 to June 2016. A total of 9 species under 9 genera of the family Verbenaceae were collected and identified. The plant was collected from Paba, Puthia, Tanore, Godagari, Charghat, Bagmara, Durgapur, Bagha and Mohanpur upazila of Rajshahi district. The methods employed during the study were designed with the sole purpose of eliciting the precious wealth of information on the medicinal uses of plants practiced by the local people. Detailed survey has been made in gathering information regarding the medicinal use has been documented. Usually, the survey in each locality (Paba, Puthia, Tanore, Godagari, Charghat, Bagmara, Durgapur, Bagha and Mohanpur) started with the interview of elderly and experienced members, locally known as Hakims. A total of 128 informants (71 male and 57 female) were interview from local people and rural Hakims/Herbalists. Besides, the common people of the surveyed localities who themselves have used these plant-based medicines for health treatments were interviewed to prove veracity of the curative features of the plants. Medicinal uses and data about the treatment of various ailments based on the information gathered by using questionnaires are given subsequently.

Identification: The plant specimens were identified by consulting different floras and literatures, viz, Ahmed et al. (2009), Hooker (1961), Prain (1963), Kiritikar and Basu (1987) and by comparing with the herbarium specimens available at the Herbarium, Department of Botany, Rajshahi University. For updated nomenclature of the species Ahmed et al. (2009), Huq (1986) and Pasha and Uddin (2013). Voucher specimens are deposited in the Herbarium, Department of Botany, Rajshahi University, Bangladesh.

3. Results and Discussion

By examining the plant materials collected from the study area using the identification methods and medicinal information was accumulated and described below.

1. Clerodendrum viscosum Vent.

Synonyms: C. infortunatum Lour., Clerodendrum cordatum D. Don.

Local name: Bhat

Status of occurrence: Common

Habit: Undershrub

Habitat: Fallow lands, roadsides, slope or bank of ponds, sometimes on cultivated field margin and also along railway tracks.

Flowering and fruiting time: January to July

Chromosome number: 2n= 48 (Gajapathy, 1961).

Distribution: India, Myanmar, Thailand, China, Indonesia, Sri Lanka and Philippines. In Bangladesh, it is often found as an undergrowth of Sal forests and bamboo arboretum in village thickets (Ahmed et al., 2009).

Taxonomic description: A shrub or undershrub, 0.9-2.4 m high. Leaves large, 10-25 cm long, ovate, acuminate, hairy on both sides. Flowers white tinged with pink, on large pubescent, panicles. Fruit, a drupe, 8 mm across, black.

Traditional medicinal uses: The plant is tonic, antipyretic and anthelmintic. Leaves and roots are used in asthma, tumors and certain skin diseases. Infusion of the leaves is used as bitter tonic and antiperiodic in malaria. Expressed juice of the leaves is laxative and cholagogue. Leaves are also used in chest complaint with cough and difficult expectoration.

Figure-1: Clerodendrum viscosum Vent.

2. Duranta repens L.

Synonyms: Duranta erecta L., Duranta plumeri Jacq.

Local name: Kantamehedi

Status of occurrence: Common

Habit: Shrub

Habitat: Plain and high lands, along the roads and margins of the garden, even everywhere as planted.

Flowering and fruiting time: Almost throughout the year

Chromosome number: 2n= 16 (Kumar and Subramaniam, 1986).

Distribution: A native of South America and West Indies naturalized in many parts of tropical Africa, Asia and Australia. In Bangladesh, it is found all over the country (Ahmed et al., 2009).

Taxonomic description: An extremely variable and polymorphic, erect to subscandent shrub to small tree, up to 7 m tall, branches slender, unarmed or spiny, often drooping branches tetragonal. Leaves are simple, decussate-opposite. Inflorescence of axillary to terminal raceme, 5-20 cm long, laxly many flowered. Flowers blue, liliac, violet, light violet to lavender or purple, 8-9 mm across, scented. Fruit a drupe, 6-8 mm in diameter, globose, orange or orange-yellow, enclosed by the accrescent, beaked, persistent calyx.

Traditional medicinal uses: Bark and the roots are astringent. Decoction made from this plant is drunk for the treatment of jaundice and biliousness.

Figure-2: Duranta repens L.

3. Gmelina arborea Roxb.

Synonyms: Premna arborea (Roxb.) Roth. Gmelina tomentosa Wall.

Local name: Gamari

Status of occurrence: Rare

Habit: Tree

Habitat: Hilly forests areas and cultivated as gardens.

Flowering and fruiting time: February to July

Chromosome number: 2n= 36, 38 (Kumar and Subramaniam, 1986).

Distribution: Native of Pakistan, Bhutan and India, distributed in Myanmar, Thailand to Indo-China, Malaya, Indonesia, introduced in many parts of Africa and South America. In Bangladesh, it occurs naturally in the forests of Chittagong, Cox's Bazar, the Chittagong Hill Tracts, Dhaka-Mymensingh forests and also lanted elsewhere (Ahmed et al., 2009).

Taxonomic description: A medium-sized deciduous tree. Leaves 10-20 cm long, broadly ovate, acuminate, entire. Flowers appearing with or before the young leaves, usually in small cymes of about 3 flowers, arranged in a panicle, reaching 30 cm long. Corolla brownish yellow, reaching 3.8 cm long, 5-lobed, 2-lipped. Drupe 2-2.5 cm long, ovoid or pyriform, orange-yellow when ripe.

Traditional medicinal uses: Juice of the young leaves is used as a demulcent in gonorrhoea and cough. Flowers are astringent; useful in leprosy and blood diseases. Fruits are diuretic, tonic, aphrodisiac, alterative, astringent to the bowels; useful in anaemia, leprosy, ulcer, consumption, strangury and vaginal discharges. Bark is bitter tonic and galactagogue. Powder of the inner portion of bark is used in scabies by the Marma tribe. Thanchangya use the bark extract with sugar for the treatment of jaundice. Roots are laxative, anthelmintic and stomachic; useful in piles, abdominal pains, burning sensations and fevers. Roots are used for the treatment of septic wounds.

Figure-3: Gmelina arborea Roxb.

4. Lantana camara L.

Synonyms: Lantana aculeata L., Lantana scabrida Soland ex Ait.

Local name: Chotra

Status of occurrence: Commom

Habit: Shrub

Habitat: In waste lands, roadsides, railway tracks and gardens.

Flowering and fruiting time: Throughout the year.

Chromosome number: 2n= 22, 36, 72 (Kumar and Subramaniam, 1986).

Distribution: India, Pakistan, Sri Lanka and tropical Africa. In Bangladesh, it is found in most areas of the country (Ahmed et al., 2009).

Taxonomic description: A large scrambling evergreen shrub, 1.2-2.4 m high with many recurved prickles on stems. Leaves opposite, 2.5-7.5 cm long, ovate, subacute, crenate-serrate, scrabrid on both sides. Flowers small, 6 mm across, variously coloured in heads, 2.5 cm across. Fruit rotundate, smooth, size of a pea, black.

Traditional medicinal uses: The plant is considered vulnerary, diaphoretic, carminative and antispasmodic; decoction is given in tetanus, rheumatism and malaria; much used in atony of abdominal viscera. Leaves are used for the treatment of measles, malaria and tetanus.

Figure-4: Lantana camara L.

5. Lippia alba (Mill.) Briton et Wilson

Synonyms: Lippia geminata H.B.&K., Lantana alba Mill.

Local name: Bhuiokra

Status of occurrence: Common

Habit: Shrub

Habitat: Mostly low-laying areas along the banks of the rivers, canels and oands, sometimes fallow lands of village thickets.

Flowering and fruiting time: Throughout the year.

Chromosome number: 2n = 30 (Bose and Choudhury, 1960).

Distribution: India and Myanmar. In Bangladesh, it occurs all over the country (Ahmed et al., 2009).

Taxonomic description: A gregarious, strongly aromatic shrub or undershrub, branches erect or suberect, slender, obscurely angled, can be easily broken, young stem and twigs hairy. Leaves simple, opposite, ovate-lanceolate or lanceolate, margin finely crenulate or serrate. Inflorescence axillary, cylindric, sub-capitate sikes, elongating up to 2.5 cm long. Flowers sessile, light to rosy-pink, scented. Fruit globose, 2 mm across, with a dry epicarp.

Traditional medicinal uses: It is a sedative, menstrual aid, and anti-hypertensive, among many things.

Figure-5: Lippia alba (Mill.) Briton et Wilson

6. Nyctanthes arbor-tristis L.

Synonyms: Nyctanthes dentata Blume, Nyctanthes tristis Salisb.

Local name: Sheuli

Status of occurrence: Frequent

Habit: Shrub

Habitat: Cultivated in gardens and homesteads.

Flowering and fruiting time: August to January

Chromosome number: Not Known

Distribution: Subtropical Himalaya, India, Pakistan and Myanmar. In Bangladesh, the species is found throughout the country (Ahmed et al., 2009).

Taxonomic description: A large shrub, often growing out into a small tree, 3-6 m tall, branchlets pubescent, 4-angular, hairy, bark rough, brown, grayish or greenish. Leaves opposite, ovate to ovate-oblong, shortly acuminate at the apex. Flowers very fragrant, 1.2-1.8 cm. across, sessile, opening during night. Fruit a capsule, 1-2 cm long, rigidly coriaceous, obovate, compressed, mucronate and often emarginated at the apex, 2-celled, glabrous, pericarp reticulate, leathery.

Traditional medicinal uses: Leaf juice is used for treatment of intestinal worms, fever, rheumatism and ascites. A decoction of bark, leaves, roots and flowers is prescribed in enlargement of spleens.

Figure-6: Nyctanthes arbor-tristis L.

7. Phyla nodiflora (L.) Greene

Synonyms: Lippia nodiflora (L.) Rich., Verbena nodiflora L., V. capitata Forssk.

Local name: Bhuiokra

Status of occurrence: Common

Habit: Herb

Habitat: Open wastelands in moist and damp soils, lawns, dry riverbeds, edge of poands, fellow waste lands, especially in poorly drained soil.

Flowering and fruiting time: Throughout the year.

Chromosome number: 2n= 24, 36 (Kumar and Subramaniam, 1986).

Distribution: Troical and subtropical regions of the world. In Bangladesh, it occurs all over the country (Ahmed et al., 2009).

Taxonomic description: A prostrate, much branched annual herb, often rooting at the nodes, up to 75 cm long. Leaves cuneate-spathulate, serrate, 2.5 cm long. Peduncles commonly axillary; heades 1.25 cm long, ovoid or cylindric. Flowers small, pinkish-purple to white.

Traditional medicinal uses: The plant is diuretic, stomachic, febrifuge and astringent to the bowels; good for ulcers, wounds, asthma, bronchitis; considered valuable in ischury, stoppage of the bowels and pain in the knee-joints. A poultice composed of the fresh plant is a good maturant for boils. Infusion of the leaves and tender stalks is given to children suffering from indigestion and to women after delivery. Chutney made from the leaves and fruits are eaten to relieve the irritation of internal piles.

Figure-7: Phyla nodiflora (L.) Greene

8. Tectona grandis L.f.

Synonyms: Tectona theka Lour, T. asiatica Hort. ex Mold., Theka grandis (L.f.) Lamk.

Local name: Shegun

Status of occurrence: Common

Habit: Tree

Habitat: Planted along roadsides, parks and gardens.

Flowering and fruiting time: July to November.

Chromosome number: 2n= 24, 36 (Kumar and Subramaniam, 1986).

Distribution: Native of Myanmar and India, distributed in Thailand, Malaya, widely cultivated almost in all topical countries of Africa and Asia. In Bangladesh, it is introduced mainly in the Chittagong Hill Tracts and also planted all over the country along roadsides, roaddividers, gardens and village thickets (Ahmed et al., 2009).

Taxonomic description: A large deciduous tree, with fluted trunk. Leaves opposite, 30-75 cm long, broadly elliptic or obovate, acuminate, cuneate at base, rough. Flowers small, 6 mm across, white in large erect, terminal cymose panicles, 0.3-0.9 m long. Fruit a sub-globose drupe, 1.3 cm diam., the pericarp soft with dense felted stellate hair, endocarp bony.

Traditional medicinal uses: The wood is laxative, anthelmintic and expectorant; useful in piles, leucoderma and dysentery. Paste of the wood is a local refrigerant and sedative, astringent, hepatic stimulant and diuretic. Powder of wood is said to be allaying skin inflammations. Oily product from wood chips is used in eczema and ringworm. The wood ash is applied on swollen eyelids. The bark and flowers are useful in bronchitis. Oil of nuts used to promote hair growth and also to cure itching of the skin. Flowers and seeds possess diuretic properties. The roots are given in anuria and retention of urine.

Figure-8: Tectona grandis L.f.

9. Vitex negundo L.

Synonym: Vitex paniculata Lamk.

Local name: Nishinda

Status of occurrence: Frequent.

Habit: Shrub

Habitat: Open waste places, along the boundary margin of the dwelling houses and gardens.

Flowering and fruiting time: April to February

Chromosome number: 2n= 24, 26, 28, 32, 34 (Kumar and Subramaniam, 1986).

Distribution: India, Nepal, Bhutan, Indo-China, West Asia, North Africa, Malaysia and Mayanmar. In Bangladesh, it is found throughout the country (Ahmed et al., 2009).

Taxonomic description: A large aromatic, evergreen to semi-evergreen shrub or small tree. Leaves digitately 3 or 5-foliate; leaflets lanceolate, 4-12 cm long, coarsely toothed, base cuneate. Flowers in pedunculate branched, tomentose cymes, opposite along the quadrangular rachis of a large, terminal panicles, up to 30 cm long; corolla 1 cm long, bluish-purple. Fruit a drupe, ovoid, size of a small pea, black when ripe.

Traditional medicinal uses: Leaves are tonic, vermifuge, antiparasitic, alterative and anodyne; relieve catarrh and headache and effective against inflammatory swellings of the joints due to acute rheumatism. Leaf Juice removes foetid discharges and worms from ulcers. A decoction of the leaves along with long pepper is given in catarrhal fever with heaviness of head and dullness of hearing. Leaf juice mixed with oil is applied to sinuses and scrofulous sores. A vapour bath prepared from the leaves is used for treating febrile, catarrhal and rheumatic affections. Leaves are used for diarrhea. Leaf-boil water is used for bath to relieve post-partum pains. Leaves are used for asthma and hair growth. Roots are tonic, febrifuge, expectorant and diuretic. Fruits are nervine, cephalic and emmenagogue; dried fruit acts as a vermifuge. Flowers are astringent and cooling.

Figure-9: Vitex negundo L.

Based on the study, a preliminary list of the family Verbenaceae of Rajshahi, Bangladesh conducted during July 2015 to June 2016. The collected information is comparable with the result of other studies in Bangladesh. A total of 5 species belonging to 5 genera were recorded in Comilla district (Hossain et al., 2005). A total of 5 species belonging to 5 genera were recorded in Gazipur district (Alam et al., 2006). A total of 6 species belonging to 6 genera are documented in Khagrachhri district (Islam et al., 2009). A total of 18 species belonging to 11 genera are recorded in Tekhnaf (Uddin et al., 2013). A total of 5 species belonging to 5 genera are recorded in Munshiganj district (Rahman et al., 2013). So far the information available, no published data recorded on the family Verbenaceae at Rajshahi in Bangladesh.

The important medicinal values of Verbenaceae family of Rajshahi were highlighted. A total of 9 medicinal plant species belonging to 9 genera were collected and recorded for their use in various ailments. These medicinal plants are used by them to cure the following diseases, especially for tonic, fever, rheumatism, worm, ulcers, asthma, headache, ringworm, piles, diuretic, eczema, skin disease, bronchitis, stomachic, boils, menstrual disease, malaria, tetanus, wounds, burning sensation, jaundice, anaemia, cough, leprosy and others. The collected medicinal information of those plant species is in agreement with the result of other studies done in Bangladesh (Ghani, 2003; Yusuf et al., 2009; Anisuzzaman et al., 2007; Khan and Huq, 1975).

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