



Systematic study and medicinal uses of Rutaceae family of Rajshahi district, Bangladesh

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Abstract

Systematic study and medicinal uses of the family Rutaceae of Rajshahi district was carried out from September 2014 to October 2015. A total of 8 species under 5 genera belonging to the family Rutaceae were collected and identified. For each species English name, botanical name, synonym, local name, 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 asthma, constipation, cough, dysentery, diarrhea, fever, filariasis, influenza, nausea, scurvy, stomachic, skin diseases and vomiting. Thus a survey was carried out, to record the traditional health care remedies currently practiced by the local people.

Keywords: Systematic study, Rutaceae, indigenous uses, Rajshahi, Bangladesh.

INTRODUCTION

Rutaceae family, consisting of about 150 genera and over 1500 species, are distributed in both the tropical and temperate regions, especially in Australia and South Africa. About 25 genera and over 80 species of this family have so far been reported from India (Sharma, 2004). In Bangladesh, this family is represented by 16 genera and 28 species (Ahmed *et al.*, 2009). Known throughout the world for its several juicy citrus fruits such as our present-day oranges, lemons, grapefruits, etc., Rutaceous members have high percentage of vitamin C as well as several alkaloids. Some of its larger genera along with their approximate number of reported species in bracket include *Fagara* (250), *Zanthoxylum* (200), *Ruta* (60), *Glycosmis* (60), *Eriostemon* (32), *Atalantia* (18), *Citrus* (12), *Murraya* (12) and *Aegle* (3) (Sharma, 2004). The importance of studying local floristic diversity and medicinal uses has been realized and carried out in Bangladesh by Alam *et al.* (2006), Arefin *et al.* (2011),

Anisuzzaman *et al.* (2007), Khan and Huq (1975), Uddin *et al.* (2013), Rahman (2013), Rahman and Jamila (2015), Rahman and Sarker (2015), Rahman and Keya (2014) and Yusuf *et al.* (2006, 2009). The main objectives of the present study are to explore, identify, medicinal aspects and document the family Rutaceae of Rajshahi district, Bangladesh.

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: Systematic investigation on the family Rutaceae growing throughout the Rajshahi district was carried out from September 2014 to October 2015. A total of 8 species under 5 genera of the family Rutaceae 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 152 informants (89 male and 63 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 (1877), Prain (1903), Kirtikar 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.

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. WOOD APPLE

Botanical name: *Aegle marmelos* (L.) Corr.

Synonym: *Crataeva marmelos* L.

Local name: Bel

Status of occurrence: Common

Habit: Medium sized tree

Habitat: Swampy lands as well as dry soils

Flowering and fruiting: April to December

Chromosome number: $2n = 18, 36$ (Kumar and Subramaniam, 1986).

Distribution: This species is believed to have originated from India. It is cultivated in Pakistan, Sri Lanka, Myanmar, South East Asia, Tropical Africa and the United States. In Bangladesh, this species is cultivated in homesteads as a fruit tree and also grows wild (Ahmed *et al.*, 2009).

Taxonomic description: A small or medium-sized deciduous tree, armed with many axillary, straight, strong, long spines. Leaves 3-foliolate, rarely 5-foliolate. Flowers greenish-white, in short axillary panicles. Fruit large, globose, with woody rind.

Traditional Medicinal Uses: Ripe fruits are used as constipation. It cleans and tones up the intestines. For best results, it should be taken in the form of *Sherbet*, which is prepared from the pulp of the ripe fruit. The unripe or half-unripe fruit is perhaps the most effective remedy for chronic diarrhea and dysentery. A fusion of bael leaves is regarded as an effective remedy for peptic ulcers. The root of this tree is used as a home remedy for curing ear problems. Medicated oil prepared from bael leaves gives relief from recurrent colds and respiratory affections.



Figure-1: *Aegle marmelos* (L.) Corr.

2. BITTER ORANGE

Botanical name: *Citrus maxima* (Burm.) Merr.

Synonyms: *Citrus grandis* (L) Osbeck, *Citrus decumana* L.

Local name: Jambura, Batabilebu

Status of occurrence: Common

Habit: Small to medium-sized tree

Habitat: Roadsides and homestead gardens

Flowering and fruiting: February to November

Chromosome number: $2n = 18, 36$ (Kumar and Subramaniam, 1986).

Distribution: This species is believed to have originated from South East Asia. Now it is cultivated throughout the tropics. In Bangladesh, it is grown in most areas of the country for its edible juicy fruits (Ahmed *et al.*, 2009).

Taxonomic description: A small to medium-sized spinous tree. Leaflets large, 15-23 cm long, ovate-oblong, petioles broadly winged. Flowers white. Fruit large, pale yellow, globose or pyriform; rind thick; pulp varying in colour from crimson to pale pink or yellow.

Traditional Medicinal Uses: The fruit is considered nutritive, cardio tonic and refrigerant; useful in influenza, cough and asthma. The rind is anthelmintic; useful in vomiting, griping of abdomen and diarrhea. The leaves are useful in epilepsy and convulsive cough.



Figure-2: *Citrus maxima* (Burm.) Merr.

3. SOUR LIME

Botanical name: *Citrus aurantifolia* (Chirst.) SW.

Synonyms: *Citrus javanica* Bl., *Limonia aurantifolia* Christ. & Panz.

Local Name: Kagzi lebu

Status of occurrence: Common

Habit: Shrubby or small tree

Habitat: Gardens

Flowering and fruiting: March to September

Chromosome number: $2n = 18, 27$ (Kumar and Subramaniam, 1986).

Distribution: Lime is believed to have originated from the East Indies. Now it is cultivated throughout the tropics and in warm subtropical areas. In Bangladesh, it is found all over the country (Ahmed *et al.*, 2009).

Taxonomic description: Spinous shrub up to 2.5 m high. Leaves winged, lamina elliptic-oblong. Racemes short; flowers small; petals usually 4. Fruit usually small, 4-6 cm long, globose or ovoid; pulp very acidic.

Traditional Medicinal Uses: Fruits are used against skin irritation and nausea; juice is stomachic, antiseptic and anthelmintic; used in biliousness, sore throat and eye complaints, relieves vomiting. Salted peel is recommended for indigestion. A glass of warm water with two tea spoonful of honey and juice of the fruit is taken as a remedy of catarrhal fever. Leaves are used in filariasis.



Figure-3: *Citrus aurantifolia* (Chirst.) SW.

4. LEMON

Botanical name: *Citrus limon* (L.) Burm.f.

Synonyms: *Citrus medica* var. *lemon* L., *Citrus limonum* Risso.

Local name: Sarbati Lebu

Status of occurrence: Common

Habit: Shrub or small tree

Habitat: Gardens

Flowering and fruiting: March to November

Chromosome number: $2n = 18, 36$ (Kumar and Subramaniam, 1986).

Distribution: Lemon is presumably native to southern Asia, now widely cultivated in the subtropics and occasionally in the tropics. In Bangladesh, it is widely cultivated throughout the country (Ahmed *et al.*, 2009).

Taxonomic description: A slow-growing shrub or small tree reaching to 15 ft high with stiff branches and stiff twigs and short or long spines in the leaf axils. The leaflets are evergreen, lemon-scented, ovate-lanceolate or ovate elliptic, 2 1/2 to 7 in (6.25-18 cm) long; leathery, with short, wingless or nearly wingless petioles; the flower buds are large and white or purplish.

Traditional Medicinal Uses: Fruit juice is rich in vitamin C, which improves resistance to infection, making it effective against cold and flu. It is taken as a preventive for stomach infections, remedy for scurvy, circulatory problems and arteriosclerosis. It is also an antiseptic, anti-rheumatic, antibacterial and antioxidant. The fruit juice is popularly used as an appetizer, stomach and in the treatment of nausea and vomiting.



Figure-4: *Citrus limon* (L.) Burm.f.

5. TOOTH BRUSH PLANT

Botanical name: *Glycosmis pentaphylla* (Retz.) A. DC.

Synonyms: *Glycosmis arborea* (Roxb.) A.DC., *Limonia pentaphylla* Retz.

Local name: Datmajan, Ati-sheora

Status of occurrence: Common

Habit: Shrub or small tree

Habitat: Roadsides and village thickets

Flowering and fruiting: August to April

Chromosome number: 2n = 16, 18 (Kumar and Subramaniam, 1986).

Distribution: South and South East Asia, the Philippines, southern China and Australia. In Bangladesh, it is found all over the country (Ahmed *et al.*, 2009).

Taxonomic description: An evergreen shrub. 0.9-1.8 m high. Leaves alternate, 3-7 foliolate, up to 18 cm long; leaflets 7.5-18 cm long, elliptic, rhomboid or ovate, aromatic when crushed. Flowers small, yellowish in terminal softly pubescent panicles, 10-30 cm long. Berry 1-1.8 cm long, ovoid, pale orange when ripe.

Traditional Medicinal Uses: Juice of the leaves is used in fever and liver complaints. A paste made of leaves mixed with ginger is externally used in eczema and other skin affections. A decoction of the roots is given for facial inflammation.



Figure-5: *Glycosmis pentaphylla* (Retz.) A. DC.

6. ELEPHANT APPLE

Botanical name: *Limonia acidissima* L.

Synonyms: *Feronia limonia* (L.) Sw., *Feronia elephantum* Corr.

Local name: Kothbel

Status of occurrence: Common

Habit: Large tree or medium tree

Habitat: Light soil in drought conditions, can tolerate periodic flooding or partial swampiness.

Flowering and fruiting: February to December

Chromosome number: 2n = 18 (Kumar and Subramaniam, 1986).

Distribution: The plant is a native of south India and Sri Lanka. Cultivated in Myanmar, Pakistan, Indo-China, Malaysia, Indonesia and the United States. In Bangladesh, it is cultivated in many districts for its edible fruits, very common in Dhaka, Rajshahi, Kushtia and other western districts (Ahmed *et al.*, 2009).

Taxonomic description: A medium-sized tree with straight sharp strong spines. Leaves imparipinnate, smelling of aniseed; petiole and rachis flat, often narrowly winged; leaflets 3-9, opposite, 2.5-5 cm long, cuneate or obovate. Flowers small, dull red in lateral or terminal panicles. Fruits 5-6.3 cm diam., globose, hard, grey.

Traditional Medicinal Uses: The unripe fruit is astringent and is used in diarrhea and dysentery. Seeds are used in heart diseases. The leaves are astringent and carminative; good for vomiting, indigestions, hiccup and dysentery. Fruit pulp is applied externally as a remedy for bites of venomous insects and reptiles and is prescribed for the treatment of biliousness. Pulp is also used to cure coughs, dysentery and heart disease, and is useful in the treatment of asthma, tumors, ophthalmia, leucorrhoea and diarrhea.



Figure-6: *Limonia acidissima* L.

7. CURRY LEAF

Botanical name: *Murraya koenigii* (L.) Spreng.

Synonyms: *Bergera koenigii* L., *Chalcas koenigii* (L.) Kurz.

Local name: Currypata

Status of occurrence: Rare

Habit: Small tree

Habitat: Gardens

Flowering and fruiting: February to May

Chromosome number: $2n = 18$ (Kumar and Subramaniam, 1986).

Distribution: This plant is native of India and Sri Lanka. Then it spread to Myanmar, Vietnam, Cambodia, Laos and South China. In Bangladesh, this species is found in the forests of Kishoreganj, Rangpur, Dinajpur, Kurigram, Panchgarh, Rajshahi, Sylhet, Chittagong and Dhaka districts (Ahmed *et al.*, 2009).

Taxonomic description: A small tree, growing 4-6m tall, with a trunk up to 40 cm diameter. The aromatic leaves are pinnate, with 11-21 leaflets, each leaflet 2-4 cm long and 1 cm broad. The plant is self-pollinated and produces small white flowers and small shiny-black berries containing a single, large viable seed.

Traditional Medicinal Uses: Leaves are eaten as a cure for diarrhea and dysentery. Crushed leaves are applied externally to cure bruises and eruptions and decoction of leaves is used in fever and snake bites. Infusion of roasted leaves is used to stop vomiting. Root of the plant acts as mild purgative and its juice is used in kidney pain. Leaves bark and root possesses antibacterial and cytotoxic properties and act in anti-tumor activity.



Figure-7: *Murraya koenigii* (L.) Spreng.

8. ORANGE JASMINE

Botanical name: *Murraya paniculata* (L.) Jack.

Synonyms: *Chalcas paniculata* L., *Murraya exotica* L.

Local name: Kamini

Status of occurrence: Very common

Habit: Shrub or small tree

Habitat: Roadsides, gardens

Flowering and fruiting: March to January

Chromosome number: $2n = 18$ (Kumar and Subramaniam, 1986).

Distribution: South and south East Asia, Southern China, Taiwan to northeastern Australia and New Caledonia. In Bangladesh, it is cultivated throughout the country as an ornamental plant (Ahmed *et al.*, 2009).

Taxonomic description: A small evergreen tree or shrub growing up 7m tall. Its leaves are glabrous and glossy, occurring in 3-7 oddly pinnate leaflets which are elliptic to cuneate-obovate to rhombic. Flowers are terminal corymbose, few flowered, dense and fragrant. Petals are

12-18 mm long. The fruit is fleshy, oblong-ovoid, colored red to orange and grows up to 2.5 cm. in length.

Traditional Medicinal Uses: Leaves of the plant are stimulant and astringent, and are used in diarrhea, dysentery and diseases of teeth. Decoction of the leaves is taken in dropsy and powdered leaf is applied to fresh cuts. Bark of ground root is eaten and rubbed on the body to relieve body ache. Bark and flowers are used in cosmetics.



Figure-8: *Murraya paniculata* (L.) Jack.

The important medicinal values of Rutaceous plant species of Rajshahi district were highlighted. A total of 8 medicinal plant species belonging to 5 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 asthma, cough, dysentery, diarrhea, fever, skin diseases, constipation, vomiting, influenza, scurvy, stomachic, filariasis 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).

Based on the study, a preliminary list of the family Rutaceae of Rajshahi district, Bangladesh was prepared during September 2014 to October 2015. The collected information is comparable with the result of other studies in Bangladesh. A total of 4 species belonging to 4 genera were recorded in Comilla district (Hossain *et al.*, 2005). A total of 4 species belonging to 4 genera were recorded in Gazipur district (Alam *et al.*, 2006). A total of 4 species belonging to 4 genera are documented in Khagrachhri district (Islam *et al.*, 2009). A total of 4 species belonged to 4 genera are documented in Habiganj district (Arefin *et al.*, 2011). A total of 10 species

belonging to 7 genera are recorded in Tekhnaf (Uddin *et al.*, 2013). A total of 5 species belonging to 4 genera are recorded in Munshiganj district (Rahman *et al.*, 2013). A total of 8 species under 5 genera are recorded in Bangladesh Police Academy, Rajshahi (Rahman *et al.*, 2014). A total of 4 species belonged to 2 genera are documented in Narsingdi district (Rahman and Debnath, 2014). So far the information available, no published data recorded on the family Rutaceae at Rajshahi district in Bangladesh.

ACKNOWLEDGEMENTS

The authors are grateful to the local people of Rajshahi district for their co-operation and help during the research work.

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