

Assessment of Medicinal Properties and Uses of Some Members of Family Rutaceae in Meerut District (U.P.)

Dr. Shyam Singh

Department of Botany, Meerut College, Meerut (U.P.)

Abstract: The present investigation and analysis of the therapeutic applications of the family Rutaceae in the Meerut district were carried out From march 2023 to October 2024. Eight species from five genera in the Rutaceae family were collected and identified. Each species has been identified by its English name, botanical name, synonym, local name, occurrence status, behavior, habitat, when it flowers and fruits, chromosomal number, range, taxonomic description, and traditional medicinal applications. There are pictures of every species. They are very effective treatments for a variety of illnesses, including asthma, constipation, cough, dysentery, diarrhea, fever, filariasis, influenza, nausea, scurvy, stomachic, skin conditions, and vomiting, according to the medical information gathered about these widely used plant species. In order to document the traditional medical practices currently used by the locals, a survey was conducted in the district.

Keywords: Systematic study, Rutaceae, indigenous uses, Meerut, Uttar Pradesh.

INTRODUCTION

The 150 genera and more than 1500 species, the Rutaceae family is found in both tropical and temperate climates, particularly in Australia and South Africa. There are currently around 80 species and about 25 genera in this family known to exist in India (Sharma, 2004). There are 16 genera and 28 species in this family in Uttar Pradesh (prabhat et al., 2023). Rutaceous members are well-known worldwide for their many luscious citrus fruits, including modern-day oranges, lemons, grapefruits, and others. They also contain a high amount of vitamin C and a number of alkaloids. *Fagara* (250), *Zanthoxylum* (200), *Ruta* (60), *Glycosmis* (60), *Eriostemon* (32), *Atalantia* (18), *Citrus* (12), *Murraya* (12), and *Aegle* (3) are some of its bigger genera, along with an estimate of the number of species documented in each bracket (Sharma, 2004). In Uttar Pradesh, research on the medicinal applications and floristic variety of the area has been recognized and conducted by, Khan and Huq (1975), the current study's primary goals are to investigate, identify, and describe the medicinal characteristics of the Rutaceae family in the Uttar Pradesh region of Meerut.

MATERIALS AND METHODS

The plant Twigs and specimen collected from the different part of the district and adjacent areas. The preservation was done with the help of Alcohol and HgCl₂. The preserved plant twig pasted on the herbarium sheets with the help of "Saresh" and after it Stretching is done the Herbarium Sheets and then preserved in the Harbarium of Meerut. College, meerut. The survey on Rutaceous plant conducted in Hastinapur sanctuary and Sardhana Tehshil and local areas of district and Sadar Tehshil done during 2023-24, and again repeated

the survey in 2024-2025 of the District Meerut is 70 kilometers North West from New Delhi and about 453 kilometers from Lucknow, the state capital of Uttar Pradesh. The strategic location of this region on the fertile plains of Rivers Ganga and Hindon, a tributary of Yamuna, is conducive for agriculture and allied activities. The state is spread across 2590 square kilometers and is situated at 77 degrees and 78° longitude East and 28° 54 and 29° 15' latitude North. Meerut district is divided into Mawana, Sardhana and Meerut Sadar divisions. The bordering districts of Meerut are Muzaffarnagar on the north, Ghaziabad, Gautam Budh Nagar and Bulandshahr on the South, Jyotibaphule Nagar and Bijnor District in the East and Baghpat District on the West.

Study Area

The study region is the northwest Uttar Pradesh district of Meerut. It belongs to the division of Meerut. The district of Meerut contains the metropolitan city of Meerut. The districts of Chapai Nawabganj and the Padma River border the Meerut district to the south, Naogaon district to the north, and Natore district to the east. The sub-tropical monsoon climate of the Meerut district is typical of Uttar Pradesh, which is located in the nation's low rainfall zone. Rainfall averages 75% from June to September. 1350 mm of rain falls there each year. The region experiences low temperatures in January, ranging from 9.0°C to 14.1°C. The temperature starts to rise in February and continues to do so until April, when it begins to fall. The temperature in April ranges from 22.6°C to 36.9°C. March has the lowest mean relative humidity (65%), while July through September has the highest (88–89%) (BBS, 2009).

Study Area

To verify the validity of the plants' healing properties, interviews were conducted with regular residents of the examined areas who had personally utilized these plant-based medications for medical purposes. The following lists the applications of medications and information on how different illnesses are treated based on data collected through questionnaires.

Identification:

The plant specimens were identified by comparing them to the herbarium specimens at Meerut Department of Botany's Herbarium and by checking several floras and literatures, such as Ahmed et al., (2009), Hooker (1877), Prain (1903), and Kirtikar and Basu (1987). The Herbarium of the Department of Botany at Meerut University in Uttar Pradesh is where voucher specimens are kept.

RESULTS AND DISCUSSION

Through the application of identification techniques to the plant materials gathered from the study region, medicinal data was gathered and is detailed below.

Wood Apple



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

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 Uttar Pradesh, this species is cultivated in homesteads as a fruit tree and also grows wild.

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 bel 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 bel leaves gives relief from recurrent colds and respiratory affections.

Bitter Orange



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

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

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

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 Uttar Pradesh, it is grown in most areas of the country for its

edible juicy fruits .

Taxonomic description: A small to medium-sized spinosus 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

Sour Lime



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

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

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

Local Name: Kagzi Niboo

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 Uttar Pradesh, it is found all over the country .

Taxonomic description: Spinosus 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.

Lemon



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

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

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

Risso.

Local name: Sarbati Niboo

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 Uttar Pradesh, it is widely cultivated throughout the country.

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.

Tooth Brush Plant



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

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

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

Local name: Ban Niboo **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 Uttar Pradesh, 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.

Elephant Apple



Figure-6: *Limonia acidissima* L.

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 Uttar Pradesh, it is cultivated in many districts for its edible fruits, very common in Dhaka, Meerut, 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, leucorrhea and diarrhea.

Curry Leaf



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

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 Uttar Pradesh, this species is found in the forests of Kishoreganj, Rangpur, Dinajpur, Kurigram, Panchgarh, Meerut, 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.

Orange Jasmine



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

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 Uttar Pradesh, 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.

The important medicinal values of Rutaceous plant species of Meerut 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 Uttar Pradesh by different workers (Khan and Huq, 1975).

Based on the study, a preliminary list of the family Rutaceae of Meerut district, Uttar Pradesh was prepared during March 2023 to October 2024. The collected information is comparable with the result of other studies in Uttar Pradesh. A total of 4 species belonging to 4 genera were recorded and 8 species under 5 genera are recorded in Uttar Pradesh. So far the information available, no published data recorded on the family Rutaceae at Meerut district in Uttar Pradesh.

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Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:

Singh, S. "Assessment of Medicinal Properties and Uses of Some Members of Family Rutaceae in Meerut District (U.P.)." *Sarcouncil Journal of Agriculture* 4.3 (2025): pp 12-18.