

**RAVENIA SPECTABILIS LINDL.: A REVIEW ON MORPHOLOGY,
PHYTOCHEMISTRY AND PHARMACOLOGICAL ASPECTS****Fatema Tabassum***

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Bangladesh, Dhaka-1205,
Bangladesh.**ABSTRACT**

This review gives an account of the current knowledge on the morphology, phytochemistry and pharmacological aspects of *spectabilis* Lindl. *R. spectabilis* also called *Lemonia spectabilis* Lindl. is a shrub and uncommon ornamental plant. Few alkaloids and steroid compounds were isolated from this plant. The crude methanolic fraction, other fractions and some isolated compounds possessed antimicrobial, antioxidant, thrombolytic, cytotoxic and cholinesterase inhibition activities. Hence the present article includes the detailed exploration of different aspects of *R. spectabilis* in an attempt to provide a direction for further research.

KEYWORDS: Antibacterial, thrombolytic, cytotoxicity, antioxidant, cholinesterase inhibition, *Ravenia spectabilis*.

INTRODUCTION

Ravenia spectabilis, belongs to the family Rutaceae, the citrus family composed of 160 genera, with about 2,070 species.^[1] The plant is a resourceful shrub and found mainly in South America and some Asian countries such as Pakistan, Bangladesh and India.^[2] This species is cultivated in many districts of Bangladesh. It is rare ornamental plant and can be grown in the sun as well as in light shade. *Ravenia spectabilis* bearing purplish-red flowers found almost throughout the year. It is included under the family Rutaceae. In Bangladesh, Rutaceae family is represented by 16 genera and 28 species.^[3] The Rutaceous plants are the source of a wide range of pharmacologically active compounds including anti-inflammatory, anti-mutagenic, anti-neoplastic and anti-implantation activities.^[4] The family is well known for producing a wide range of secondary metabolites, such as phenanthridine, acridone and

furo- and pyranoquinoline alkaloids, complex furo- and pyranocoumarins, flavonoids and various types of terpenoids, including limonoids.^[5]

Common Name Lemonia, Limonia, Pink Ravenia.^[6]

Taxonomic hierarchy of the plant *Ravenia spectabilis*

Kingdom	Plantae
Subkingdom	Viridaeplantae
Phylum	Tracheophyta
Class	Magnoliopsida
Sub Class	Rosidae
Order	Rutales
Family	Rutaceae
Genus	<i>Ravenia</i>
Species	<i>R. spectabilis</i>

MORPHOLOGY

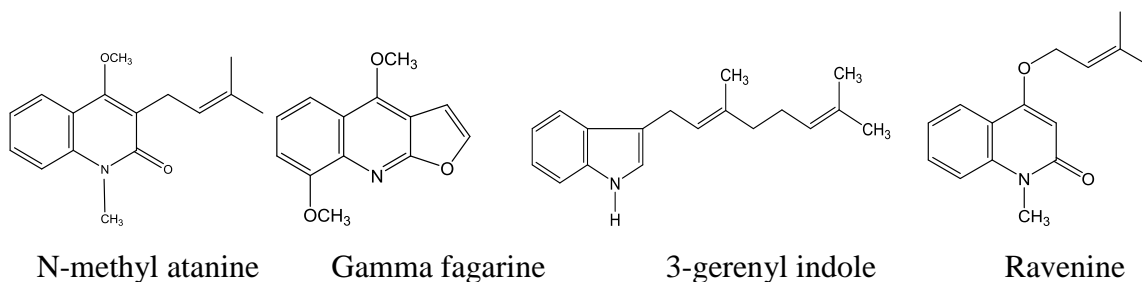
Growth Form: Large, woody shrub which is able to grow up to 3 - 5 m tall.

Foliage: Elliptic dark green foliage separated into 3 leaflets and measuring about 3 - 5 cm long.

Flowers: Bright dark pink flowers, flattened in shape, measuring about 2 - 6 cm wide, 5 sepals, corolla tube pink in colour and corolla tube measuring about 1 - 3 cm long.^[7]

PHYTOCONSTITUENTS

The plant mainly contains alkaloids, steroid compounds and other secondary metabolites. The alkaloids isolated from *R. spectabilis* are ravesilone, spectabiline, paraensine, ravenine, ravenoline, atanine, γ -fagarine, arborinine, γ -fagarine N-methyl atanine, 2,3,3,5-tetramethyl-2,3,4,5-tetrahydrofurano [3,2-c] quinolin-4-one, 3-geranyl indole. The plant also contains steroids such as stigmasta-22-dien-3one, sitosta-4-en-3-one, stigmasterol, lupeol. Other obtained secondary metabolites are 3-methoxy-4-hydroxy cinnamic acid, Isatin, Lichexanthone, α -Cadinol, and α -Spinasterone.^[2,8]



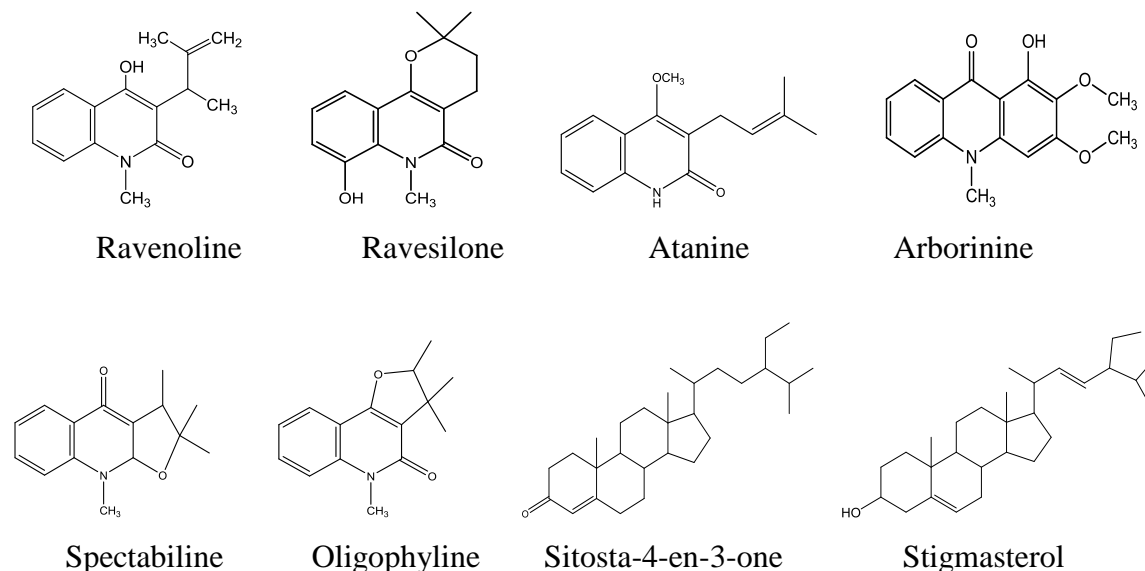


Figure: Structures of some reported phytochemicals from *R. spectabilis*.

PHARMACOLOGICAL ACTIVITIES

Antimicrobial, antioxidant, cytotoxic, thrombolytic and cholinesterase inhibition activity have been reported from this plant.^[2,8,9] The plant contains alkaloids, steroid and other secondary metabolites which may be responsible for its biological activities.

Antimicrobial activity

The crude methanolic extract showed good activity against *Bacillus cereus* (18 mm), *Bacillus megaterium* (16 mm) and *Shigella dysenteriae* (15 mm). The growth of *Bacillus cereus* (14 mm) and *Vibrio parahemolyticus* (12 mm) of the carbon tetrachloride partitionate of the methanolic extract possessed significant zone of inhibition. The chloroform partitionate of the methanolic extract possessed moderate activity against *B. cereus* (15 mm) and *S. dysenteriae* (14 mm).^[10] The pure compound ravenoline has shown moderate activity against *Bacillus subtilis*, high activity against *Vibrio cholera*.^[11]

Cytotoxic activity

The n-hexane partitionate of the methanolic extract showed the maximum activity with LC₅₀ value of 4.26 µg/mL. The carbon tetrachloride as well as chloroform partitionate of the methanolic extract exhibited significant brine shrimp lethality with LC₅₀ values of 12.15 µg/mL and 22.19 µg/mL, respectively. One pure compound named g-fagarine showed moderate brine shrimp lethality the LC₅₀ value was found to be 5.02 µg/mL.^[10]

Antioxidant activity

In free radical scavenging assay, the crude methanol extract showed moderate antioxidant activity with IC_{50} value 78.25 $\mu\text{g/mL}$ (Haque et al., 2011). Other investigation demonstrated that carbon tetrachloride and aqueous fraction of the plant showed the moderate inhibitory concentration with IC_{50} value of 97.53 $\mu\text{g/mL}$ and 110.89 $\mu\text{g/mL}$, respectively.^[11]

Thrombolytic activity

Different fractions of crude methanolic extract and the pure compound arborinine of *Ravenia spectabilis* showed moderate thrombolytic activity. The petroleum ether fraction showed highest clot lysis activity (48.85 %).^[11]

Cholinesterase inhibition activity

Acetylcholinesterase inhibition of dichlorometane leaves extract of *R. spectabilis* possessed promising AChE inhibition activity (54.4%) and this inhibition is comparable to other plant extracts from Rutaceae such as for fruits of *Aegle marmelos* (44.6%) and leaves of *Esenbeckia leioacarpa* (91.1%).^[8]

From another investigation, it was found that arborinine showed promising activity in inhibiting acetylcholinesterase with IC_{50} values of 13.14 ± 0.07 . Arborinine also potentially inhibited butyrylcholinesterase with IC_{50} values of 25.82 ± 0.34 .^[12]

CONCLUSION

Ravenia spectabilis has proved to be an important source of bioactive natural products as some of the identified compounds. The plant possesses antimicrobial, antioxidant, thrombolytic, cytotoxic and cholinesterase inhibition activities. Further investigations of the extracts as well as the isolated compounds are required specially, biological and molecular docking studies for unveiling probable activities.

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