JOURNAL OF CLINICAL AND BIOMEDICAL SCIENCES

REVIEW ARTCLE

OPEN ACCESS

Received: 13-08-2024
Accepted: 26-06-2025
Published: 22-09-2025

Citation: Savitha PN, Rajani V, Nagaraju C, Divya K. A Review on Medicinal Value and Pharmacological Profile of *Mussaenda erythrophylla*. J Clin Biomed Sci 2025; 15(3): 156-162. https://doi.org/10.58739/jcbs/v15i3.24.98

* **Corresponding author**.

rajanivallepu390@gmail.com

Funding: None

Competing Interests: None

Published By Sri Devaraj Urs Academy of Higher Education, Kolar, Karnataka

ISSN
Print: 2231-4180
Electronic: 2319-2453

A Review on Medicinal Value and Pharmacological Profile of *Mussaenda erythrophylla*

Savitha P N[1], Rajani Vallepu[1]*, Nagaraju C[2], Divya K[1]

1 Department of Pharmacology, SKU College of Pharmaceutical Sciences, Ananthapuramu, 515003, Andhra Pradesh, India
2 Department of Biochemistry, Yogi Vemana University, YSR Kadapa, 516003, Andhra Pradesh, India

Abstract

Mussaenda erythrophylla, a botanical treasure, has revealed numerous pharmacological potentials warranting scientific investigation. The hydroalcoholic extract of its leaves demonstrated dose-dependent analgesic, anti-inflammatory, and antipyretic activities. Notably, the leaf extract exhibited robust antioxidant activity, comparable to vitamin C, as evidenced by DPPH and NO assays. Methanolic extracts of the plant showed promising in vitro anthelmintic activity against earthworms. Additionally, root extracts in chloroform and ethanol significantly increased urine volume. Methanolic and ethyl acetate extracts of the plant protected against CCl4-induced hepatotoxicity in rats, as indicated by decreased serum enzyme levels. The plant extracts also demonstrated anti-arthritic properties through proteinase inhibition and denaturation assays. Ethanolic leaf extract showed potent anti-plasmodial activity against *P. falciparum*, with minimal toxicity. Furthermore, the leaf extract effectively inhibited carbon steel corrosion in a 1M HCl solution. Phytochemical analysis of floral extracts revealed the presence of steroids and triterpenoids.

Keywords: Herbal remedy; Analgesic; antioxidant; Anti-arthritic; Anti-plasmodial; Corrosion inhibition

1 Introduction

Mussaenda erythrophylla, a semideciduous plant thriving in temperate and subtropical regions, has been traditionally employed in treating various ailments, including leukoderma, eye problems, dermal issues, tuberculosis, hyperbilirubinemia, ulcers, wounds, coughing, and bronchial inflammations.[1] The plant's antioxidant properties are attributed to its natural constituents, found in various parts, such as bark, leaves, flowers, roots, fruits, and seeds.[2] In traditional medicine, crushed leaves and flowers are applied topically to wounds, while the glossy leaf-like bracts are used to prepare a hair wash solution[3]. Ornamentally, *Mussaenda erythrophylla* is valued for its vibrant and long-lasting

inflorescences.[4] In African and Asian traditional medicine, this species is utilized to treat intestinal worms, eye infections, body aches, diarrhea, dysentery, cough, and jaundice.[5] The roots are also consumed as an appetizer and used to treat acute gastroenteritis, laryngopharyngitis, and exhibit diuretic, antiphlogistic, antifertility, and antitumor activities.[2] The *Mussaenda* genus is notable for its ease of growth, resistance to severe cutting, and immunity to pests and diseases.[6] Ayurvedic literature recommends the leaves for treating arthritis.[7] Previous studies have investigated the effects of temperature, rooting substrate type, propagation date, cutting site, and 1H-indole-3-butyric acid on rooting in *Mussaenda erythrophylla*.[8]

Mussaenda erythrophylla, a semideciduous plant with diverse traditional uses, has garnered attention for its potential therapeutic applications. Despite its widespread use in traditional medicine, a comprehensive understanding of its pharmacological properties and bioactive compounds is lacking. This review aims to investigate the current state of knowledge on *M. erythrophylla*'s bioactivities, phytochemical composition, and potential therapeutic applications, with a specific focus on answering the following question: What are the pharmacological effects and potential uses of *M. erythrophylla*?

Fig 1. Plant, Leaves, Florets, and Fruits of *Mussaenda erythrophylla*

2 Taxonomy

- **Botanical Name:** *Mussaenda erythrophylla*
- **Author:** Schumach & Thonn (1827).[9]
- **Family:** Rubiaceae
- **English Names:** Ashanti blood, Prophet's tears, Red mussenda, Tropical dogwood, Red flag bush, Virgin tree

Common Names:

- Bengali: Sadapatta
- Hindi: Bedina
- Konkani: Mithai phool
- Manipuri: Hanu rel
- Sinhalese: Mussendra
- Tamil: Vellaiyilai
- Telugu: Mussenda
- Sanskrit: Nagavalli

Other Names:

- Spanish: Flore de trapo
- Jamaica: Ashanti blood
- Puerto Rico: Colombina roja
- US Virgin Islands: Scarlet mussenda
- Thai: Khun ying arun daeng, Donya daeng
- French: Sang des Achantis
- Portuguese: Mussaenda-vermelha

Synonyms: M*ussenda fulgens* R.Br.ex Tendile, M*ussenda splendid* Welw.[9–11]

3 Description and Habitat

Mussaenda erythrophylla is a sprawling, multi-stemmed, semi-deciduous shrub. It is often used in gardens and landscape construction due to its open, somewhat scrambling bushes. The leaves are elliptic to round, brilliant green to dark green, and oppositely arranged. They are frequently visible and pubescent. The fruit is a small, fleshy, somewhat elongated berry with many seeds. The flowers are small and tubular, borne in branching terminal panicles virtually continuously throughout the year.[3]

Mussaenda erythrophylla is native to tropical Africa but has been introduced to tropical and subtropical regions, where it is grown as an ornamental. It can be found naturally in China, India, French Polynesia, Fiji, South and Central America, the West Indies, and other parts of the world.[3]

4 Methodology

- **Literature Search:** A comprehensive literature search was conducted using various databases, including PubMed, Scopus, and Google Scholar, to identify relevant studies on *Mussaenda erythrophylla*. The search terms used included "*Mussaenda erythrophylla*," "phytochemical analysis," "bioactivities," "therapeutic applications," and "traditional uses."
- **Inclusion and Exclusion Criteria:** Studies were included if they investigated the phytochemical composition, bioactivities, or therapeutic applications of *Mussaenda erythrophylla*. Studies were excluded if they were duplicates, reviews, or lacked sufficient data.
- **Data Extraction:** Relevant data were extracted from the included studies, including information on the plant's phytochemical composition, bioactivities, and therapeutic applications.
- **Data Analysis:** The extracted data were analyzed qualitatively to identify patterns, trends, and correlations. The bioactivities of *Mussaenda erythrophylla* were categorized and discussed in relation to its potential therapeutic applications.
- **Quality Assessment:** The quality of the included studies was assessed based on factors such as study design,

sample size, and methodology. Studies with limitations or biases were noted and considered in the interpretation of the results.

- **Phytochemical Screening:** *Mussaenda erythrophylla* has been found to contain a diverse range of bioactive compounds, including:

1. (a) **Iridoids:** Such as iridoid glycosides and aglycone.
   (b) **Saponins:** Identified in hydroalcoholic extracts.
   (c) **Flavonoids:** Including flavonol glucosides and flavanoids.
   (d) **Phenolic acids:** Such as 4-hydroxy-3-methoxy cinnamic acid.
   (e) **Triterpenoids:** Including pentacyclic triterpenes.
   (f) **Steroids:** Such as β-sitosterol.
   (g) **Essential oils:** Identified in leaf extracts [12–16].

- **Phytochemical Analysis:** Various studies have identified unique compounds in *Mussaenda erythrophylla*, including:

1. (a) **Cyclolanostene types:** Identified in phytochemical analysis.
   (b) **Quinic acid derivatives:** Identified in dichloromethane/methanol extracts.
   (c) **Iso-coumarin and coumarin:** Identified in dichloromethane/methanol extracts [1,5,12].

- **Bioactive Compounds:** The plant extracts have been found to exhibit various bioactivities, including hepatoprotective and antioxidant properties, attributed to the presence of:

1. (a) **Flavanoids:** Contributing to antioxidant activity.
   (b) **Triterpenes:** Contributing to hepatoprotective activity.
   (c) **Phytosterols:** Contributing to antioxidant activity [17–19]

5 Pharmacological & Related scientific studies of *Mussaenda erythrophylla*

Pharmacology is the critical study of how drugs are effective and safe in treating, preventing, or diagnosing diseases. This review comprehensively covers all the information on *Mussaenda erythrophylla* regarding its medicinal importance and pharmacological activities. Scientific Explorations in Pharmacology, Biotechnology and Material science are summarized in Table 1 and illustrated in Figure 2.

5.1 Anti-Inflammatory Activity

Anti-inflammatory activity is crucial in pharmacology, as anti-inflammatory drugs (AIDs) can help treat various conditions, including Alzheimer's, Parkinson's, and rheumatoid arthritis.[1] AIDs can also aid in wound healing and prevent disease spread.

5.1.1 ***Acute Anti-Inflammatory Research***

Using carrageenan-induced paw swelling in rats, the hydroalcoholic extract of *Mussaenda erythrophylla* (HAME) was evaluated. Wistar rats were administered HAME at 200 and 400 mg/kg, and indomethacin at 10 mg/kg. The results showed that HAME exhibited higher inhibition of 66% and 83% at the two doses, respectively, compared to indomethacin, which achieved 87% suppression.[5]

5.1.2 ***Chronic Anti-Inflammatory Research***

HAME was also evaluated for its chronic anti-inflammatory effects using the cotton pellet-induced granuloma method. The results showed that HAME significantly suppressed granulomatous tissue formation, demonstrating a robust ability to prevent the exudative and proliferative phases of granuloma development.[5]

5.2 Analgesic Activity

5.2.1 ***Peripheral Analgesic Activity***

The peripheral analgesic activity of HAME was evaluated using the acetic acid-induced writhing test in mice. The results showed that HAME significantly decreased the number of writhes, with a maximum inhibition of 75.25% and 59.90% at 200 and 400 mg/kg, respectively.[5]

5.2.2 ***Central Analgesic Activity***

The central analgesic activity of HAME was evaluated using the hot plate method in mice. The results showed that HAME produced a dose-dependent increase in latency time, with a maximum inhibition of 76.24% and 42.65% at 200 and 400 mg/kg, respectively.[5]

5.3 Antipyretic Activity

The antipyretic activity of HAME was evaluated using the yeast-induced pyrexia test in rats. The results showed that HAME significantly reduced the rectal temperature, with a maximum inhibition of $37.03 \pm 0.010^{\circ}$C and $36.75 \pm 0.005^{\circ}$C at 200 and 400 mg/kg, respectively.[5]

5.1 4 Antioxidant Activity

5.4.1 ***Nitric Oxide Scavenging Activity***

The nitric oxide scavenging activity of HAME was evaluated using the Griess reaction. The results showed that HAME exhibited a dose-dependent increase in nitric oxide scavenging activity, with an IC50 value of 380 μg/ml.[15]

5.4.2 ***DPPH Radical Scavenging Activity***

The DPPH radical scavenging activity of HAME was evaluated using the DPPH assay. The results showed that HAME exhibited a dose-dependent increase in DPPH radical scavenging activity, with an IC50 value of 630 μg/ml.[15]

5.5 Effective Green Corrosion Inhibitor of Carbon Steel

The effectiveness of *Mussaenda erythrophylla* leaf extract (MELE) as a corrosion inhibitor for carbon steel in 1M HCl was evaluated using electrochemical techniques. The results showed that MELE exhibited a maximum inhibition efficiency of 95% at a concentration of 400 mg/L.[16]

5.6 Antimicrobial Activity

The antimicrobial activity of *Mussaenda erythrophylla* flower extract was evaluated using the cup plate method. The results showed that the extract exhibited significant antimicrobial activity against *Escherichia coli, Bacillus subtilis*, and *Staphylococcus aureus*.[20]

5.7 Antihelminthic Activity

The antihelminthic activity of *Mussaenda erythrophylla* root extract was evaluated using the earthworm assay. The results showed that the extract exhibited significant antihelminthic activity, with a maximum inhibition of 80.33% at a concentration of 100 mg/ml.[21]

5.8 Hepatoprotective Activity

The hepatoprotective activity of *Mussaenda erythrophylla* leaf extract was evaluated using the paracetamol-induced liver damage model in rats. The results showed that the extract exhibited significant hepatoprotective activity, with a maximum inhibition of 73.33% at a dose of 200 mg/kg.[22]

5.9 Antiplasmodial Activity

The antiplasmodial activity of *Mussaenda erythrophylla* stem, petal, and leaf extracts was evaluated using the Plasmodium lactate dehydrogenase (pLDH) assay. The results showed that the ethanolic leaf extract exhibited the highest antiplasmodial activity, with an IC50 value of 3.74 μg/ml.[12]

5.10 Photosynthesis of Silver Nanoparticles

The photosynthesis of silver nanoparticles using *Mussaenda erythrophylla* leaf extract was evaluated. The results showed that the extract exhibited a clear peak at 414 nm, indicating the formation of silver nanoparticles. The nanoparticles were characterized using various spectroscopic techniques, including FTIR, EDAX, XRD, and PCS.[23]

Table 1. Summary of biological activities & their potential applications of *Mussaenda erythrophylla*

SI No	Solvent type	Part of plant	Pharmacological Activity	References
1	Hydroalcohol	Leaves	Anti-inflammatory activity	[5]
2	Hydroalcohol	Leaves	Analgesic activity	[5]
3	Hydroalcohol	Leaves	Antipyretic activity	[5]
4	Ethanol	Leaves	Antioxidant activity	[15]
5	Ethanol	Leaves	Nitric oxide scavenging	[15]
6	Ethanol-Water	Leaves	Corrosion inhibitor	[16]
7	Hexane, Methanol	Flowers	Antimicrobial activity	[20]
8	Ethyl Acetate, Methanol	Roots	Antihelminthic activity	[21]
9	Ethanol	Leaves	Hepatoprotective activity (Paracetamol)	[22]
10	Ethanol	Leaves	Antiplasmodial activity	[12]
11	Ethanol	Leaves	Photosynthesis of silver nanoparticles	[23]
12	Chloroform, Ethanol	Roots	Diuretic activity	[24]
13	Ethyl Acetate, Methanol	Roots	Hepatoprotective activity (CCl4)	[25]
14	Acetone-water	Leaves	In vitro anti-arthritic activity	[26]
15	Ethyl acetate, Methanol	Stem	In vitro antioxidant and free radical scavenging activity	[27]
16	Methanol	Leaves	In vitro cytotoxicity	[28]
17	Water	Stem	Mass cloning via somatic embryogenesis	[29]
18	Ethanol Chloroform	Leaves, stem	Anti-urolithiatic activity	[30]

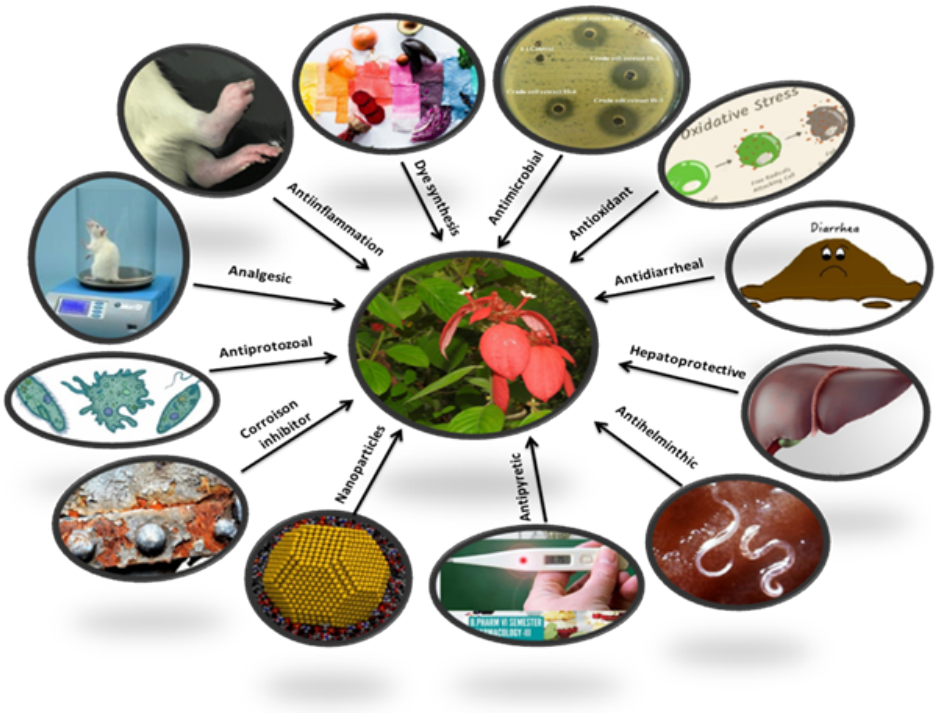

Fig 2. Diverse biological activities of *Mussaenda Erythrophylla*

6 Discussion

6.1 Bioactivities of *Mussaenda erythrophylla*

Mussaenda erythrophylla exhibits a range of bioactivities, including anti-inflammatory, analgesic, antipyretic, antiplasmodial, anthelmintic, diuretic, anticancer, and antibacterial properties.

6.2 Mechanisms of Action

The plant's bioactivities are attributed to its diverse range of phytochemicals, including squalene, phytol, β-sitosterol, oleic acid amide, and quinic acid. These compounds may interact with various molecular targets, such as enzymes, receptors, and signaling pathways, to exert their effects.

6.3 Critical Evaluation

While the bioactivities of *Mussaenda erythrophylla* are promising, further research is needed to fully understand its mechanisms of action, potential therapeutic applications, and safety profile. Some studies have limitations, such as small sample sizes or inadequate controls, which may impact the reliability of the findings.

6.4 Future Directions

Future studies should investigate:

1. The exact mechanisms of action underlying each bioactivity.
2. Optimized dosing regimens and delivery methods to enhance efficacy and bioavailability.
3. The potential interactions between *M. erythrophylla* and other medications or health conditions.

6.5 Therapeutic Potential

Mussaenda erythrophylla's diverse range of bioactivities makes it a promising candidate for various therapeutic applications, including pain management, infectious diseases, and cancer treatment. However, further research is needed to confirm its efficacy and safety in humans.

7 Conclusion

This review highlights the remarkable potential of *Mussaenda erythrophylla*, with its diverse range of bioactivities and therapeutic applications. The plant's antiplasmodial, anthelmintic, diuretic, anticancer, and antibacterial properties make it a promising candidate for treating various diseases. Notably, its hydroalcoholic extract has demonstrated strong analgesic, anti-inflammatory, and antipyretic properties.

Practical Implications: *M. erythrophylla* could be explored as a natural remedy for pain management, liver-related diseases, and other conditions. Its therapeutic value could be further enhanced through standardization of extracts and dosing regimens.

Future Research Directions: Future studies should focus on:

1. Clarifying the exact mechanisms behind *M. erythrophylla*'s pharmacological actions.
2. Investigating its therapeutic applications in clinical settings.
3. Conducting further phytochemical analysis to identify potential lead compounds.

Policy Relevance: Policymakers could consider supporting further research on M. erythrophylla to develop evidence-based guidelines for its use in traditional medicine.

8 Disclosure

Acknowledgement: The authors would like to extend their sincere gratitude to their guide, friends, and institution for their invaluable support and guidance throughout the preparation of this review article.

Author Contributions: Conceptualization and Design: V Rajani, Literature Search and Data Collection: P N Savitha, K Divya, Critical Review and Editing: C Nagaraju

References

1) Yadav G. Phytochemical screening and antimicrobial (clinical) study of Mussaenda erythrophylla: a comprehensive analysis. *International Journal of Creative Research Thoughts*. 2022;10(2):c22–c34. Available from: https://ijcrt.org/papers/IJCRT2202236.pdf.
2) Vidyalakshmi KS, Hannah R, Vasanthi, Rajamanickam GV. Ethnobotany, phytochemistry and pharmacology of Mussaenda species (Rubiaceae). *J Ethnobot Leaflets*. 2008;12(1):469–475. Available from: https://www.researchgate.net/publication/41115519_Ethnobotany_Phytochemistry_and_Pharmacology_of_Mussaenda_Species_Rubiaceae.
3) and JRS. Mussaenda erythrophylla (red flag bush). *CABI Compendium*. 2018. Available from: https://doi.org/10.1079/cabicompendium.120124.
4) Aurigue FB. Floriculture and Ornamental Plants. Singapore. Springer. 2022. Available from: https://doi.org/10.1007/978-981-15-3518-5_20.
5) Suresh A, Rajendren RA, Aswathi K, Alex AS, Parveen H, Venkatesh S. Pharmacological evaluation of Mussaenda erythrophylla leaves extract for analgesic, anti-inflammatory, and antipyretic activities. *international journal of pharmaceutical research*. 2021;22(2):114–127. Available from: https://ijppr.humanjournals.com/wp-content/uploads/2021/10/8.pdf.
6) Bharathi V, Swarnalatha D, Sreenivasulu M. A review on Mussaenda species. 2013. Available from: https://www.pharmatutor.org/articles/review-mussaenda-species#google_vignette.
7) Eswaraiah MC, Elumalai A, Manasa N. Pharmacognostical evaluation of Mussaenda erythrophylla Linn leaves. *Research Journal of Pharmacognosy and Phytochemistry*. 2012;4(4):197–200. Available from: https://rjpponline.org/AbstractView.aspx?PID=2012-4-4-1.
8) Hilaire RS, Berwart CAF. Three Mussaenda Cultivars Propagated by Stem Cuttings Exhibit Variation in Rooting in Response to Hormone and Rooting Conditions. *HortTechnology*. 2000;10(4):780–784. Available from: https://dx.doi.org/10.21273/horttech.10.4.780.
9) Schumacher CF, Guin B. Mussaenda erythrophylla Schumach. & Thonn. GBIF Backbone . . Available from: https://doi.org/10.15468/39omei.
10) Pingyuan W. Red Flag bush (Mussaenda Erythrophylla). Xishuangbanna Tropical Botanical Garden: Chinese Academy of Sciences. 2010. Available from: http://english.xtbg.cas.cn/rs/ma/201008/t20100806_57171.html.
11) Chantaranothai P. A synopsis of Mussaenda L. (Rubiaceae) in Thailand. Thai For Bull Bot. 2015. Available from: https://li01.tci-thaijo.org/index.php/ThaiForestBulletin/article/view/44208.
12) Chaniad P, Phuwajaroanpong A, Techarang T, Viriyavejakul P, Chukaew A, Punsawad C. Antiplasmodial activity and cytotoxicity of plant extracts from the Asteraceae and Rubiaceae families. *Heliyon*. 2022;8(1):e08848. Available from: https://dx.doi.org/10.1016/j.heliyon.2022.e08848.
13) Eswaraiah MC, Elumalai A. Isolation of phytoconstituents from the stems of Mussaenda erythrophylla. *Der Pharmacia Sinica*. 2011;2(6):132–142. Available from: https://www.researchgate.net/publication/225034218.
14) Larissa T, Bouzeko F, Léonie M, Dongmo BL, Ndontsa C, Armel N, et al. Chemical constituents of Mussaenda erythrophylla Schumach. & Thonn (Rubiaceae) and their chemophenetic significance. *Biochemical Systematics and Ecology*. 2024;98:104329. Available from: https://doi.org/10.1016/j.bse.2021.104329.
15) Madhuri K, Priyanka KS, Priya KB, Amulya M, Narender B, Vasudha B, et al. Assessment of antioxidant activity of leaf extract of Mussaenda erythrophylla. *Chemistry Research Journal*. 2022;7(5):1–7. Available from: https://chemrj.org/download/vol-7-iss-5-2022/chemrj-2022-07-05-1-7.pdf.
16) Koffi A, Muralidharan S, Trokourey A. Mussaenda erythrophylla leaves as effective green corrosion inhibitor of carbon steel. *Chemical Science Review and Letters*. 2015;4(16):1188–1198. Available from: https://chesci.com/wp-content/uploads/2016/10/V4i16_26_CS13204610.pdf.
17) Rajaramanan T, Gourji FH, ogenthiran Elilan, Yohi S, Senthilnanthanan M, Ravirajan P, et al. Natural sensitizer extracted from Mussaenda erythrophylla for dye-sensitized solar cell. *Scientific Reports*. 2023;13(1):13844. Available from: https://doi.org/10.1038/s41598-023-40437-6.
18) Alejandro GD, Razafimandimbison SG, Liede-Schumann S. Polyphyly of Mussaenda inferred from ITS and trnT-F data and its implication for generic limits in Mussaendeae (Rubiaceae). *American Journal of Botany*. 2005;92(3):544–557. Available from: https://dx.doi.org/10.3732/ajb.92.3.544.
19) Priyadarshan PM, Ramachandran KC. Cytology and exceptional pollen development in Mussaenda Linn. *Journal of Japanese Botany*. 1982;49(2):407–413. Available from: https://www.jstage.jst.go.jp/article/cytologia1929/49/2/49_2_407/_pdf.
20) Manoj Y, Narendra D, Praveena CH, Appalanarsayya CH, Priya ML, Keerthana M. Antimicrobial activity studies of Mussaenda erythrophylla. *International Journal of Pharmaceutical Sciences Review and Research*. 2017;46(1):42–46. Available from: https://globalresearchonline.net/journalcontents/v46-1/08.pdf.
21) Jayaraju N, Gangarao B. Anthelminthic activities of Antigonon leptopus Hook and Mussaenda erythrophylla Lam. *International Journal of Pharmacy and Pharmaceutical Science*. 2011;3(1):63–64. Available from: https://www.innovareacademics.in/journal/ijpps/Vol3Issue1/961.pdf.
22) Rojin TS, Shetty S, Holla R. Determination of hepatoprotective effect of Mussaenda erythrophylla in paracetamol-induced hepatotoxicity. *International Journal of Basic and Clinical Pharmacology*. 2017;4(6):1124–1128. Available from: https://doi.org/10.18203/2319-2003.ijbcp20151344.
23) Varadavenkatesan T, Selvaraj R, Vinayagam R. Phyto-synthesis of silver nanoparticles from Mussaenda erythrophylla leaf extract and their application in catalytic degradation of methyl orange dye. *Journal of Molecular Liquids*. 2016;221:1063–1070. Available from: https://dx.doi.org/10.1016/j.molliq.2016.06.064.

24) Gunasekaran S, Sundaramoorthy S, Sathiavelu M, Arunachalam S. The genus Mussaenda-A phytopharmacological review. *Journal of Chemical and Pharmaceutical Research*. 2015;7(7):1037–1042. Available from: https://www.jocpr.com/articles/the-genus-mussaenda-a-phytopharmacological-review.pdf.
25) Eswaraiah MC, Satyanarayana T. Hepatoprotective activity of extracts from stem of Mussaenda erythrophylla against carbon tetrachloride-induced toxicity in rats. *Journal of Pharmaceutical Sciences and Research*. 2010;2(1):23–31. Available from: https://core.ac.uk/download/pdf/235570954.pdf.
26) Palit P, Talukdar S, Kundu A, Mandal SC, Mandal T, and DD. Phytochemical investigations and pharmacological evaluation of the different bioactive fractions obtained from the leaves of Mussaenda erythrophylla and Datura metel Linn and biodistribution studies of fluorescent based phospholipid vesicles of their extract. *Journal of Biochemistry and Pharmacology*. 2013;2(4):121–122. Available from: http://dx.doi.org/10.4172/2167-0501.S1.003.
27) Eswaraiah MC, Satyanarayana T. In vitro antioxidant and free radical scavenging activity of stem of Mussaenda erythrophylla. *International Journal of Pharmaceutical Sciences and Research*. 2010;1(9):20–26. Available from: http://dx.doi.org/10.13040/IJPSR.0975-8232.1(9-S).20-26.
28) Astalakshmi N, Ganapathy RS. In vitro cytotoxicity studies on methanolic leaf extract of Mussaenda erythrophylla Schumach. and Thonn. *Research Journal of Pharmacy and Technology*. 2020;13(2):831–839. Available from: https://doi.org/10.5958/0974-360X.2020.00157.2.
29) Das P. Mass cloning of Rose and Mussaenda, popular garden plants, via somatic embryogenesis. *Horticultural Science*. 2010;37(2):70–78. Available from: https://doi.org/10.17221/392/2009-HORTSCI.
30) Sreekumar S, Sreekumar NS. Antimicrobial activity of Mussaenda erythrophylla. *Indian Journal of Pharmaceutical Sciences*. 2007;69(4):546–548. Available from: https://doi.org/10.4103/0250-474X.36961.