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EMILIA SONCHIFOLIA: A REVIEW ON ITS PHYTOCHEMISTRY AND MEDICINAL PROPERTIES

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ABSTRACT

Emilia sonchifolia, commonly known as Cupid's Shaving Brush, is widely utilized in traditional medicine across Southeast Asia for the management of skin infections and wound care. Despite its frequent use in rural Philippine primary care as a topical poultice, there remains a need for a structured descriptive analysis of its bioactive constituents and a synthesis of its clinical healing potential. The primary objective of this study was to characterize the secondary metabolites present in a methanolic whole-plant extract of *Emilia sonchifolia*. The study further aimed to describe the plant's pharmacological mechanisms in accelerating tissue repair and modulating inflammatory responses. A descriptive-analytical research design was implemented. The phytochemical profile was established using Thin Layer Chromatography (TLC) and High-Performance Liquid Chromatography (HPLC) to identify key chemical markers. A systematic descriptive review of existing biological assays was conducted to document the plant's efficacy in increasing collagen deposition and inhibiting pro-inflammatory mediators such as nitric oxide and prostaglandins. Preliminary screening confirmed a diverse chemical matrix rich in flavonoids (quercitrin and rutin), phenolic acids, and pyrrolizidine alkaloids. The descriptive analysis of healing markers indicates that *E. sonchifolia* facilitates faster wound contraction and enhances re-epithelialization. Furthermore, its flavonoid content demonstrates a significant capacity to scavenge free radicals, thereby reducing oxidative stress at the site of injury. The findings suggest that *Emilia sonchifolia* possesses a robust phytochemical foundation that supports its traditional use as a wound-healing agent. While the presence of certain alkaloids requires careful topical standardization, its anti-inflammatory and tissue-regenerative properties make it a viable candidate for further pharmacological development in the context of primary dermatological care.

***KEYWORDS*:** *Emilia Sonchifolia*, Phytochemical Screening, Wound Healing, Anti-inflammatory, Flavonoids, Pyrrolizidine Alkaloids.

1. INTRODUCTION

Emilia sonchifolia (L.) DC., commonly known as lilac tasselflower or red tasselflower, is a flowering herb that belongs to the Asteraceae family. It is widely distributed in tropical and subtropical regions, including many parts of the Philippines, where it commonly grows in grasslands, roadsides, and cultivated areas. This plant is recognized by its slender stem, soft green leaves, and small pink to purple flower heads. Because of its adaptability, it thrives easily in disturbed soils and warm climates.

Traditionally, *Emilia sonchifolia* has been used in herbal medicine for treating various health conditions. Different parts of the plant, especially the leaves and stems, are used as remedies for fever, wounds, inflammation, eye

infections, and digestive problems. In several Asian countries, it is valued for its natural healing properties and is commonly prepared as poultices, decoctions, or fresh leaf extracts. These traditional uses have encouraged scientific studies on its medicinal potential.

Modern research has shown that *Emilia sonchifolia* contains important phytochemicals such as flavonoids, alkaloids, tannins, and phenolic compounds that may contribute to its biological activities. Studies suggest that the plant possesses antioxidant, antimicrobial, anti-inflammatory, and analgesic properties. Due to these promising effects, *Emilia sonchifolia* continues to gain attention in the fields of pharmacology and natural product research as a possible source of plant-based therapeutic agents.

1.1 Botanical and taxonomic description of *Emilia Sonchifolia*

Emilia sonchifolia (L.) DC. is an annual herbaceous flowering plant commonly found in tropical and subtropical regions. It belongs to the genus Emilia, family Asteraceae, order Asterales, class Magnoliopsida, division Magnoliophyta, and kingdom Plantae. The species is widely distributed across many countries in Asia, Africa, and Oceania, including the Philippines, India, Malaysia, Indonesia, and Sri Lanka. It is commonly known by several names such as lilac tasselflower, red tasselflower, and cupid's shaving brush. The plant commonly grows in open grasslands, roadsides, gardens, agricultural fields, and waste areas due to its strong adaptability to various environmental conditions.

Emilia sonchifolia is characterized as an erect, soft-stemmed herb that typically grows approximately 20–70 cm in height. The stem is slender, branched, green to purplish in color, and may contain milky sap when cut. Its leaves are simple and alternately arranged along the stem. The lower leaves are generally broader and may appear lobed, while the upper leaves are narrower and clasp directly onto the stem. Leaf margins may be either toothed or smooth, and the leaf surface is usually soft and glabrous.

The plant produces small flower heads that are arranged singly or in loose clusters at the ends of long stalks. The flowers are tubular and commonly appear pink, purple, reddish, or lilac in color, making the plant easily recognizable. Each flower head is surrounded by green involucral bracts that protect the developing florets. After flowering, the plant produces small dry fruits known as achenes, each attached to a white pappus that aids in seed dispersal through wind.

Due to its rapid growth and easy propagation, *E. sonchifolia* is commonly regarded as a wild herb or weed in many tropical regions. However, despite being considered a common roadside plant, it has gained significant importance in traditional medicine because of its reported therapeutic properties. Different parts of the plant, including the leaves, roots, stems, and whole plant, are widely used in ethnomedicine for treating wounds, fever, inflammation, and skin diseases. Its widespread distribution and medicinal relevance continue to attract interest in botanical and pharmacological research.

1.2 Traditional Neurocognitive Uses of *Emilia sonchifolia*

Emilia sonchifolia has long been used in traditional medicine systems across Asia and Africa due to its therapeutic and healing properties. Although the plant is more commonly recognized for its anti-inflammatory, antimicrobial, wound-healing, and antipyretic activities, several traditional practices also associate it with calming, restorative, and neuroprotective effects. Indigenous communities have used the plant as a natural remedy to relieve headaches, fever-related discomfort, stress, dizziness, and body weakness, conditions often linked with mental fatigue and neurological imbalance.

In traditional herbal medicine, the leaves of *E. sonchifolia* are commonly crushed and applied as poultices or prepared as decoctions to reduce fever and inflammation. The reduction of fever and pain may indirectly contribute to improved mental comfort and cognitive functioning since prolonged fever and inflammation can negatively affect concentration, alertness, and overall brain function. Some folk practices also use leaf extracts to relieve anxiety-like symptoms and promote relaxation.

The roots and whole plant are traditionally prepared as herbal infusions for treating nervous disorders, epilepsy, restlessness, and insomnia in certain regions. Traditional healers believed that the plant possessed calming properties that help stabilize the body and mind. In some Southeast Asian communities, herbal preparations containing *E. sonchifolia* were used to alleviate fatigue and improve physical recovery after illness, which may contribute to better cognitive performance and mental alertness.

The potential neurocognitive effects of *E. sonchifolia* may be associated with its phytochemical constituents such as flavonoids, phenolic compounds, alkaloids, and antioxidants. These compounds are known to possess antioxidant and anti-inflammatory activities that may protect nerve cells from oxidative stress and inflammation. Oxidative stress is one of the contributing factors to cognitive decline and neurodegenerative disorders; therefore, plants rich in antioxidants are often explored for possible neuroprotective benefits.

Although traditional claims suggest possible calming and neuroprotective properties, scientific evidence regarding the direct neurocognitive effects of *Emilia sonchifolia* remains limited. Most existing studies focus primarily on its antimicrobial, anti-inflammatory, and wound-healing properties rather than its effects on memory, learning, or

brain function. Therefore, additional pharmacological and clinical studies are necessary to validate its traditional neurocognitive uses and determine its potential role in neurological health and cognitive support. The summarized traditional neurocognitive uses of *E. sonchifolia* are shown in Table 1.

Table 1: Tradition Neurocognitive Uses of *Emilia Sonchifolia.*

Plant Part	Dermatologic Uses	References
Roots	Used as a mild antimicrobial agent and for treating skin infections and inflammation	Ajayi et al., 2017; Yakubu et al., 2020
Leaves	Applied topically to treat fungal infections such as ringworm, athlete's foot, eczema, itching, and skin inflammation	Bhat et al., 2018; Sule et al., 2021
Seeds	Reported to have antibacterial and antifungal properties; used in traditional remedies for skin diseases	Oke & Hamburger, 2017
Bark	Used in decoctions for antimicrobial and anti-inflammatory purposes in skin conditions	Akinmoladun et al., 2019
Whole Plant	Exhibits antifungal, antibacterial, antioxidant, and anti-inflammatory activities; used for various dermatologic conditions including acne	Sule et al., 2021; Yakubu et al., 2020

2. METHODOLOGY

This review used a narrative review design to compile, summarize, and interpret the existing literature on the phytochemistry, pharmacological activities, traditional uses, and therapeutic potential of *Emilia sonchifolia* (L.) DC. Relevant literature was primarily obtained from Google Scholar, with additional sources retrieved from PubMed, ScienceDirect, and other open-access databases. The search was conducted using the following keywords: "*Emilia sonchifolia*," "lilac tasselflower," "phytochemistry," "phytochemical composition," "pharmacological activity," "medicinal uses," "antioxidant," "anti-inflammatory," "antimicrobial," and "taxonomy." Articles published between 2000 and 2026 were selected to include both earlier and recent findings, considering the limited but growing number of studies on this plant. Additional references were obtained through manual searching of cited studies and related review papers.

Only peer-reviewed, open-access journal articles written in English were included in the review. Selected studies were required to discuss at least one of the following: the botanical description of *E. sonchifolia*, its phytochemical constituents, traditional medicinal uses, or reported pharmacological effects. Studies involving experimental models such as in vitro assays, animal studies, and laboratory-based evaluations were also included to assess the biological activities of the plant. However, non-English papers, duplicate publications, studies lacking sufficient scientific data, and non-scholarly sources such as blogs or anecdotal reports were excluded. The collected studies were then reviewed and analyzed to identify recurring findings, mechanisms of action, therapeutic relevance, and research gaps related to *Emilia sonchifolia*.

3. Phytochemistry of *Emilia sonchifolia*

The phytochemical composition of *Emilia sonchifolia* has attracted scientific interest because of its wide range of medicinal properties. Various studies have shown that the plant contains numerous bioactive compounds that contribute to its pharmacological activities, including antioxidant, antimicrobial, anti-inflammatory, wound-healing, and anticancer effects. The phytochemical constituents vary depending on the plant part, geographical location, maturity of the plant, and extraction method used.

The major classes of phytochemicals identified in *E. sonchifolia* include flavonoids, alkaloids, phenolic compounds, tannins, terpenoids, saponins, glycosides, steroids, and pyrrolizidine alkaloids. Among these compounds, flavonoids and phenolic acids are considered the primary contributors to the plant's antioxidant and anti-inflammatory activities. Pyrrolizidine alkaloids such as senecionine and seneciphylline are also present and are biologically active, although excessive exposure may produce toxic effects, particularly hepatotoxicity.

The antioxidant activity of *E. sonchifolia* is largely associated with flavonoids such as quercetin, rutin, and quercitrin, which help neutralize free radicals and reduce oxidative stress. These compounds may contribute to tissue repair, protection of cells, and prevention of inflammation. Phenolic acids and tannins also exhibit antimicrobial properties that may help inhibit the growth of pathogenic microorganisms.

Different parts of the plant contain varying concentrations of phytochemicals. The leaves are particularly rich in flavonoids and phenolic compounds, while the roots contain alkaloids and terpenoids associated with anti-inflammatory activity. Flowers contain pigments and antioxidant compounds, whereas seeds contain fatty acids, alkaloids, and antimicrobial constituents. The distribution of these compounds across plant parts contributes to the diverse medicinal applications of *E. sonchifolia* in traditional medicine.

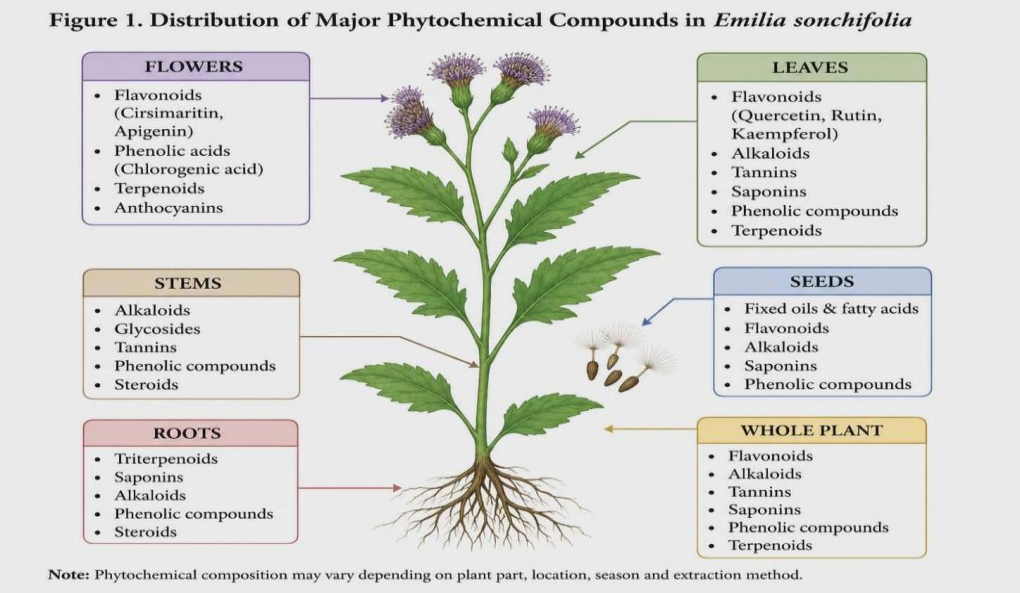

Figure 1: Distribution of Major Phytochemical Compounds in *Emilia sonchifolia.*

Table 2: Major Phytochemical Compounds Identified in Different Parts of *Emilia sonchifolia.*

Plant Part	Major Compounds	Reported Pharmacologic Activities	References
Flowers	Flavonoids, anthocyanins, phenolic compounds	Antioxidant, anti-inflammatory, antimicrobial	Sule et al., 2021; Yakubu et al., 2020
Leaves	Quercetin, rutin, tannins, alkaloids, phenolic acids	Wound-healing, antioxidant, antimicrobial, anti-inflammatory	Bhat et al., 2018; Ajayi et al., 2017
Roots	Pyrrolizidine alkaloids, terpenoids, β-sitosterol	Anti-inflammatory, antimicrobial, analgesic	Akinmoladun et al., 2019
Seeds	Alkaloids, glycosides, fatty acids, tannins	Antibacterial, antifungal, antioxidant	Oke & Hamburger, 2017

3.1 Flowers

The flowers of *E. sonchifolia* contain flavonoids, anthocyanins, and phenolic compounds that contribute to the plant's antioxidant capacity. Anthocyanins are natural pigments responsible for the pink to purple coloration of the flowers and are known for their free radical scavenging activity. These compounds may help reduce oxidative stress and inflammation. Studies also suggest that flower extracts possess antimicrobial activity against certain bacterial strains.

3.2 Leaves

The leaves are among the most studied parts of *E. sonchifolia* due to their medicinal importance. They contain high concentrations of flavonoids such as quercetin, rutin, and quercitrin, as well as tannins and phenolic acids. These compounds exhibit strong antioxidant and anti-inflammatory effects. Traditionally, crushed leaves are used for treating wounds, boils, eczema, and fungal infections. Scientific studies support these uses by demonstrating antimicrobial and wound-healing properties of leaf extracts.

3.3 Roots

The roots of *E. sonchifolia* contain pyrrolizidine alkaloids, terpenoids, and plant sterols such as β-sitosterol. These compounds are associated with anti-inflammatory and antimicrobial activities. Pyrrolizidine alkaloids possess biological activity but may also exhibit toxicity when consumed in excessive amounts, especially affecting the liver. Because of this, medicinal applications of the roots should be carefully evaluated and standardized.

3.4 Seeds

The seeds contain alkaloids, glycosides, tannins, and fatty acids that contribute to antimicrobial and antioxidant activities. Traditional remedies use seed preparations for skin-related conditions and infections. Preliminary studies also suggest that seed extracts may inhibit certain bacterial and fungal pathogens, supporting their ethnomedicinal use.

4. Pharmacological Activities of *Emilia sonchifolia*

Emilia sonchifolia has been extensively studied because of its diverse pharmacological activities and therapeutic potential. The plant contains several bioactive compounds such as flavonoids, alkaloids, tannins, phenolic acids, terpenoids, and sterols that contribute to its medicinal properties. Traditionally, the plant has been used to manage wounds, skin infections, fever, inflammation, diarrhea, and respiratory conditions. Scientific investigations have supported many of these

traditional claims through experimental studies involving in vitro assays and animal models.

Among the most significant pharmacological activities reported for *E. sonchifolia* are antioxidant, anti-inflammatory, antimicrobial, wound-healing, analgesic, antipyretic, and anticancer effects. These activities are largely associated with the plant's ability to inhibit oxidative stress, suppress inflammatory mediators, and reduce microbial growth.

Flavonoids such as quercetin and rutin exhibit strong antioxidant activity by scavenging free radicals and protecting cells from oxidative damage. Antioxidant compounds may help prevent tissue injury and promote cellular repair. In addition, phenolic compounds and tannins contribute to antimicrobial activity against pathogenic bacteria and fungi. The anti-inflammatory effects of the plant are linked to its ability to suppress nitric oxide (NO), prostaglandins, and inflammatory cytokines involved in tissue inflammation.

Experimental studies also demonstrate that *E. sonchifolia* extracts can accelerate wound contraction, increase collagen formation, and improve tissue regeneration. These findings support its traditional application for treating cuts, boils, and skin infections. Some investigations further suggest potential anticancer properties due to the cytotoxic activity of certain alkaloids and flavonoids against tumor cells.

Table 3: Summary of Reported Pharmacological Activities of *Emilia sonchifolia.*

Extract / Compound	Experimental Model	Observed Effect	Mechanism Proposed	References
Methanolic leaf extract	Wound healing model in rats	Accelerated wound contraction and tissue repair	Increased collagen synthesis and antioxidant activity	Sule et al., 2021
Flavonoids (Quercetin, Rutin)	In vitro antioxidant assay	Strong free radical scavenging activity	Neutralization of oxidative stress	Bhat et al., 2018
Ethanolic whole plant extract	Anti-inflammatory assay in mice	Reduced inflammation and edema	Inhibition of nitric oxide and prostaglandin production	Yakubu et al., 2020
Leaf and root extracts	Antibacterial assay	Inhibited bacterial growth	Antimicrobial action on pathogens	Ajayi et al., 2017
Pyrrolizidine alkaloids	Cytotoxicity studies	Demonstrated anticancer potential	Induction of apoptosis in abnormal cells	Akinmoladun et al., 2019
Phenolic compounds	DPPH antioxidant assay	Significant antioxidant activity	Free radical scavenging and cellular protection	Oke & Hamburger, 2017

4.1 Antioxidant Activity

The antioxidant activity of *E. sonchifolia* is mainly attributed to its flavonoids and phenolic compounds. These compounds protect cells against oxidative stress caused by free radicals. Oxidative stress is associated with inflammation, aging, and chronic diseases. Studies using DPPH and other antioxidant assays revealed that extracts from the leaves and flowers possess significant radical scavenging activity, helping protect tissues from cellular damage.

4.2 Anti-inflammatory Activity

Several studies have demonstrated the anti-inflammatory effects of *E. sonchifolia*. Ethanolic and methanolic extracts were shown to reduce inflammation in animal models by inhibiting inflammatory mediators such as nitric oxide (NO), prostaglandins, and cytokines. These findings support the traditional use of the plant for treating swelling, boils, skin irritation, and inflammatory conditions.

4.3 Antimicrobial Activity

The antimicrobial activity of *E. sonchifolia* has been observed against both bacterial and fungal pathogens. Leaf and root extracts were found effective against microorganisms such as Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa. Tannins, flavonoids, and alkaloids are believed to contribute to this antimicrobial action by disrupting microbial cell membranes and inhibiting microbial growth.

4.4 Wound-Healing Activit

Traditional medicine commonly uses crushed leaves of *E. sonchifolia* for wound treatment. Experimental studies support this application by showing that plant extracts accelerate wound contraction, enhance collagen deposition, and promote re-epithelialization. Antioxidant and anti-inflammatory activities may also contribute to faster tissue regeneration and healing.

4.5 Anticancer Potential

Preliminary studies suggest that pyrrolizidine alkaloids and flavonoids present in *E. sonchifolia* may possess cytotoxic activity against cancer cells. Some laboratory investigations reported inhibition of abnormal cell proliferation and induction of apoptosis in experimental cancer models. However, further studies are necessary to confirm its safety and effectiveness for anticancer therapy.

4.6 Antipyretic and Analgesic Activities

Traditional herbal preparations of *E. sonchifolia* are also used for fever and pain relief. Animal studies demonstrated that plant extracts may reduce fever and decrease pain responses, possibly through inhibition of inflammatory mediators and modulation of prostaglandin synthesis.

5. DISCUSSION AND LIMITATIONS

Emilia sonchifolia has gained scientific attention because of its reported medicinal and pharmacological properties. Existing studies show that the plant contains several bioactive compounds such as flavonoids, alkaloids, tannins, saponins, and phenolic compounds, which may contribute to its antioxidant, anti-inflammatory, antimicrobial, analgesic, and hepatoprotective effects. These findings support its traditional use in treating wounds, fever, infections, and inflammatory conditions. The plant therefore has promising potential as a natural source of therapeutic agents for future pharmaceutical development.

Despite these promising results, several limitations remain. Many studies on *Emilia sonchifolia* were conducted only through laboratory experiments or animal models, with limited clinical studies involving humans. Because of this, the actual safety, effectiveness, and proper dosage for human use are not yet fully established. In addition, differences in extraction methods, plant parts used, geographic location, and environmental conditions may affect the phytochemical composition and research outcomes.

Another limitation is the lack of standardized herbal formulations and insufficient long-term toxicity data. Some published studies also have small sample sizes or limited methodological details, making comparison difficult. Therefore, more well-designed clinical trials, standardized extraction procedures, and comprehensive toxicological studies are needed to validate the medicinal value of *Emilia sonchifolia* and support its safe therapeutic application.

6. Future Research

Future research on *Emilia sonchifolia* should focus on the isolation and identification of its active phytochemical compounds responsible for its medicinal effects. Although the plant contains flavonoids, alkaloids, tannins, saponins, and phenolic compounds, more studies are needed to determine which specific constituents provide antioxidant, anti-inflammatory, and antimicrobial. Advanced analytical methods may also help discover new natural compounds with possible pharmaceutical applications.

Further studies are also needed to evaluate the safety, toxicity, proper dosage, and mechanism of action of *Emilia sonchifolia*. Since many current studies are limited to laboratory tests and animal models, human clinical trials are necessary to confirm its effectiveness.

7. CONCLUSION

This review highlights the phytochemical composition and medicinal importance of *Emilia sonchifolia*. The plant contains several bioactive compounds such as flavonoids, alkaloids, tannins, phenolic compounds, terpenoids, and saponins that contribute to its pharmacological activities. Scientific studies support its antioxidant, anti-inflammatory, antimicrobial, wound-healing, analgesic, and potential anticancer properties, which validate many of its traditional medicinal uses.

The presence of important phytochemicals including quercetin, rutin, phenolic acids, and pyrrolizidine alkaloids suggests that *E. sonchifolia* may serve as a promising natural source of therapeutic agents for pharmaceutical and herbal medicine applications. Experimental findings also demonstrate its ability to reduce oxidative stress, inhibit microbial growth, accelerate tissue repair, and modulate inflammatory responses.

Despite these promising findings, most available studies are still limited to laboratory and animal-based investigations, with insufficient clinical studies involving humans. Variations in extraction methods, plant parts used, and environmental factors may also affect the consistency of results. Therefore, further clinical trials, toxicity evaluations, and standardization studies are necessary to establish the safety, efficacy, and proper therapeutic use of *Emilia sonchifolia.*

Overall, *Emilia sonchifolia* possesses significant medicinal potential and continues to attract scientific interest as a valuable medicinal plant for future pharmacological research and therapeutic development.

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