Chapter 6

Ethnomedicinal and ethnopharmacological values of *Scoparia dulcis* L.

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Abstract: *Scoparia dulcis* L., a perennial herb widely distributed in tropical and subtropical regions, holds noteworthy ethnomedicinal and ethnopharmacological importance. Traditionally, various parts of the plant, including leaves, roots, and stems, have been used in folk traditional medicine to treat a wide range of ailments such as diabetes, hypertension, fever, cough, and gastrointestinal disorders. Scientific studies have validated many of these traditional uses, revealing a rich phytochemical profile that includes flavonoids, terpenoids, alkaloids, and phenolic compounds. These bioactive constituents are responsible for the plant's diverse pharmacological activities, including antioxidant, anti-inflammatory, antimicrobial, antidiabetic, and hepatoprotective effects. The chapter mostly encompasses on ethnomedicinal and ethnopharmacological aspects of different plant parts of *S. dulcis*. Therefore, in future further research into the mechanisms of action and potential drug development from *S. dulcis* is warranted to harness its full therapeutic potential and contribute to the development of new, natural-based medicines.

Keywords: Ethnomedicinal, traditional knowledge, phytochemical, pharmacological

Introduction

The use of plants for medicinal purposes is an ancient practice that forms the bridge of traditional healthcare systems in worldwide. Ethnobotany, the study

of the relationship between people and plants, highlights the profound knowledge of indigenous and local communities regarding the therapeutic properties of flora (Petrovska, 2012). This traditional knowledge wisdom, passed down through generations, has provided a rich source of inspiration for modern drug discovery (Lal et al., 2024). According to literature review, Plantaginaceae consists of 107 genera and about 1,900 species. All genera of Plantaginaceae were formerly included in Scrophulariacae. In the family Plantaginaceae in the genera Scoparis has 11 accepted species (POWO, 2025). One such plant, *Scoparia dulcis*, has garnered significant attention for its widespread use in folk medicine and its promising pharmacological profile. *Scoparia dulcis* L., commonly known as "sweet broom weed," is a perennial herb belonging to the family Plantaginaceae. Native to tropical and subtropical regions of the Americas, it has since become naturalized in various parts of the world, including India, Brazil, Myanmar, and the West Indies (Phan and Nguyen, 2014). It is mostly found in roadside and wasteland areas. The flowering and fruiting are mostly throughout the year. In these regions, the plant is a common weed but is highly valued for its medicinal properties. The plant's name, "sweet broom," refers to its sweet taste and the traditional use of its stems as temporary brooms. Its versatile application in traditional medicine makes it a prime subject for ethnopharmacological investigation. Phytochemical screening of the plant has revealed a complex array of bioactive compounds, including alkaloid, reducing sugar, steroid, flavonoid, saponin, flavones, terpenes and steroids, phenols, tannins, saponins, amino acids, coumarins and carbohydrates. The main chemicals include scopadulcic acids A and B, scopadiol, scopadulciol, scopadulin, scoparic acids A – C, tannin and betulinic acid. Other chemical constituents acacetin, amyrin, apigenin, benzoxazin, benzoxazolin, benzoxazolinone,

cirsimarin, cirsitakaoside, coixol, coumaric acid, cynaroside, daucosterol, dulcinol, dulcioic acid, gentisic acid, glutinol, hymenoxin, linarin, luteolin, mannitol, scoparinol, scutellarein, scutellarin, sitosterol, stigmasterol, taraxerol, vicenin, and vitexin (Saikia et al., 2013; Phan and Nguyen, 2014; Paul et al., 2017; Aysha et al., 2020). Ethnomedicinally, *S. dulcis* has been utilized to treat a remarkable diversity of ailments. Across different cultures, various parts of the plant, including the whole plant, leaves, roots, and stems, have been prepared as decoctions, infusions, or poultices. Traditional uses include managing conditions such as diabetes, hypertension, fever, cough, bronchitis, and gastrointestinal issues like diarrhoea and stomach ache. It is also used for skin disorders, haemorrhoids, diuretic and analgesic (Murtl et al., 2012; Aysha et al., 2020; Sarkar et al., 2020). The historical and ongoing use of this plant by traditional healers and communities accentuates its perceived efficacy and cultural significance as a panacea for various health problems. Scientific studies have begun to validate the traditional claims, providing a strong basis for the ethnopharmacological values of *S. dulcis*. These compounds are believed to be responsible for the plant's wide range of documented pharmacological activities, which include antioxidant, anti-inflammatory, antimicrobial, antidiabetic, and hepatoprotective effects (Agrawal et al., 2014). Apart from medicinal value it’s also have significant role in other aspects such as bushy stem are used for brooms in some countries (Aysha et al., 2020). This chapter will explore the traditional uses of *S. dulcis* and the scientific evidence supporting its therapeutic potential, bridging the gap between ancient wisdom and modern scientific understanding. It is an erect much branched glabrous herb or undershrub, up to 60 cm; stems 4-6 angled or lined.

Figure 1: Habit and habitat of *S. dulcis*

Figure 2: Flowers of *S. dulcis*

Leaves are petiolate, 3-nately whorled, upper often opposite, rhomboid, elliptic, ovate or lanceolate, serrate, acute, glandular, base tapering; petiole scarcely separable from the tapering leaf-base. Flowers 3-6 from each whorl; pedicels long. Sepals are 3- nerved, slightly shorter than the capsule. Corolla white, 5mm across, divided nearly to the base. Stamens as long as corolla. Style stout. Capsule sub globose, valves ultimately 2-fid (Saxena and Brahmam, 1995; Figure 1-2).

Methodology

Through field and literature survey it concluded that it possesses wide array of ethnomedicinal uses and through literature survey it revealed its pharmacological values. Literature data was gathered from Scopus, Web of Science, Springer, PubMed, Google Scholar, using search terms "*S. dulcis*, "phytochemistry", "Pharmacology"," ethnomedicinal uses", "other uses"

MDPI, Science Direct, SciFinder, Scirus, and Scientific Electronic Library Online (SciELO) from 2022-2025 (Jena et al., 2025; Kumar, 2025).

Results and discussion

The plant exhibits a range of traditional medicinal uses, with various parts to treat different ailments. Through literature survey it revealed that the leaves are used to treat malaria, cough, and cuts/wounds, while the leaves and twigs are used for jaundice and as an emetic. The stem and leaves are used to treat diabetes, and the whole plant is used for fever, kidney stones, nephritis, snake bites, and diabetes (Table 1). These findings highlight the plant's versatility in traditional medicine and its potential for further pharmacological investigation. The use of different plant parts for various ailments suggests a sophisticated understanding of the plant's properties and potential applications.

Table 1: Ethnomedicinal uses of different parts of *Scoparia dulcis*

Plant parts	Mode of uses	Diseases	Sources
Leaves	Infusion	Malaria	Aysha et al., (2020)
Leaves	Decoction	Cough	Gogoi et al., (2019)
Leaves	Paste	Cuts and wounds	Mishra et al., (2016)
Leaves and twigs	Decoction	Jaundice	Das and Choudhury (2012)
Leaves and twigs	Infusion	Emetic	Das and Choudhury (2012)
Root	Decoction	Digestive problems	Kumar et al., (2022)
Stem and leaves	Decoction	Diabetes	Aysha et al., (2020)

Whole plant	Infusion	Fever and kidney stones	Sarkar et al., (2020)
Whole plant	Decoction	Nephritis	Sarkar et al., (2020)
Whole plant	Decoction	Snake bite	Sarkar et al., (2020)
Whole plant	Decoction	Diabetes	Deb and Sharma. (2021)

Table 2: Pharmacological activities of *Scoparia dulcis*

Plant parts	Pharmacological activities	Sources
Leaves	Anti-diabetic activity	Pamunuwa et al., (2016); Aysha et al., (2020)
Leaves	Analgesic and anti-inflammatory activity	Okanlawon et al., (2022); Thykkaden et al., (2025)
Leaves	Antimicrobial activity	Sarkar et al., (2020)
Leaves	Anti-sickling activity	Abere et al., (2015);
Leaves	Anti-hyperlipidemic activity	Sarkar et al., (2020)
Leaves	Anti-ulcer activity	Sarkar et al., (2020)
Leaves	Nephroprotective activity	Aysha et al., (2020)
Whole plant	Anti-malarial activity	Sarkar et al., (2020)
Whole plant	Antioxidant activity	Sarkar et al., (2020); Arulandhu et al., (2025)

The plant's ability to treat a range of conditions, including diabetes, fever, and snake bites, makes it a valuable resource for traditional medicine. Further studies are needed to validate the efficacy and safety of these traditional uses and to explore the plant's potential for modern medicinal applications. The results of this chapter support the importance of documenting and preserving

traditional knowledge of medicinal plants. By understanding the traditional uses of plants like this one, researchers can identify potential leads for new medicines and work to conserve and sustainably use these valuable resources. According to literature survey it concluded that it possesses many pharmacological activities such as hypoglycaemic, antitumor, antiviral, hyperlipidaemia, antioxidant, and analgesic activity (Saikia et al., 2013). The leaves have demonstrated anti-diabetic, analgesic, anti-inflammatory, antimicrobial, anti-sickling, anti-hyperlipidemic, anti-ulcer, and nephroprotective activities.

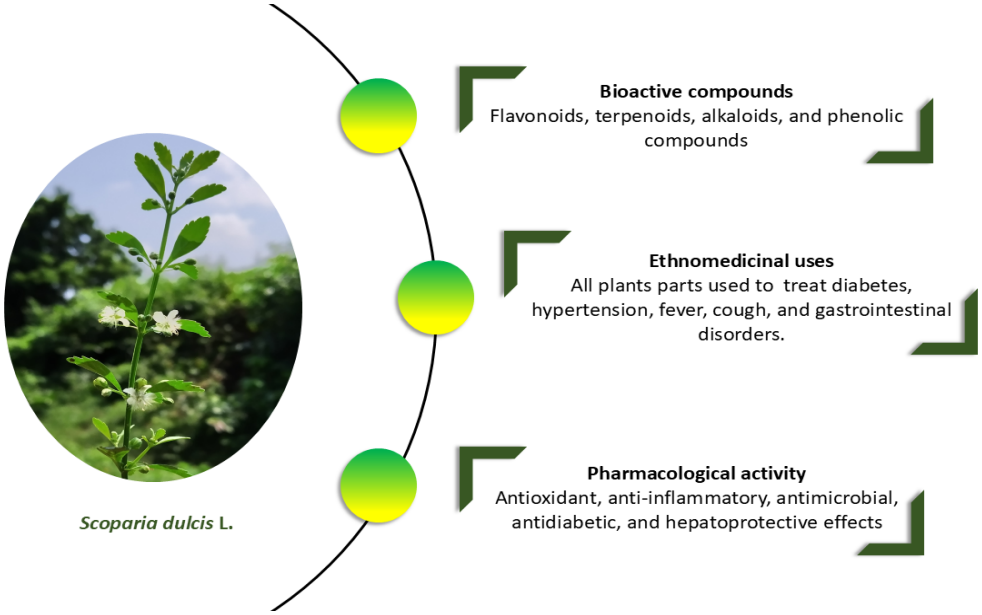

Figure 3: Illustration to justify *S. dulcis* for various important factors

These literature suggest that the plant's leaves may be a valuable resource for developing new treatments for a range of diseases. The whole plant has also shown significant pharmacological activity, with anti-malarial and

antioxidant properties observed. The anti-malarial activity is particularly noteworthy, given the ongoing need for effective treatments against this disease. The antioxidant activity suggests that the plant may have potential in preventing or treating conditions associated with oxidative stress (Table 2). Overall, the plant's diverse range of pharmacological activities makes it a promising candidate for further research and development. Its potential uses in traditional medicine are supported for further studies are warranted to fully explore its therapeutic potential and ensure safe usage (Figure 3).

Conclusion

Scoparia dulcis represents a compelling example of a traditional medicinal plant that are widespread ethnomedicinal uses have been extensively validated by modern ethnopharmacological research. The traditional use of this "sweet broom weed" as a panacea for conditions ranging from diabetes and gastrointestinal ailments to fevers, skin disorders, and hypertension is supported by the identification of a rich array of bioactive compounds, including diterpenoids, flavonoids, and triterpenoids. Scientific studies have confirmed its notable antidiabetic, antioxidant, anti-inflammatory, antimicrobial, and even anti-cancer properties. This synthesis of traditional knowledge and scientific evidence not only justifies the plant's long-standing use in various cultures but also highlights its significant potential as a source for developing new therapeutic agents.

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