

Chapter 2

Phytochemical analysis of *Schleichera oleosa* bark: a medicinal tree of India

Kishore Thakur*, Susanta Nanda, Rajesh Kumar Biswal, Nihar Ranjan Roul and Sidhanta Mahakud

Bhima Bhoi College, Rairakhol, Sambalpur, Odisha, India

*Email-Id: kishorthakur196@gmail.com



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Abstract: *Schleichera oleosa*, locally known as Kusum, is used in traditional medicine for centuries, was subjected to comprehensive phytochemical analysis. Aqueous, acetone, and ethanol extracts of bark revealed the presence of tannins, saponins, phenolic compounds, reducing sugars, and alkaloids. Present study highlights the potential of *S. oleosa* bark as a valuable source of natural remedies. Further research is needed to isolate and characterize bioactive compounds, evaluate pharmacological activities, and conduct clinical trials to confirm safety and efficacy.

Keywords: Bark, bioactive compounds, phytochemicals, pharmacology

INTRODUCTION

Medicinal plants have been the cornerstone of traditional medicine for centuries, with approximately 80% of the global population relying on them for primary healthcare (Vimala et al., 2024; Sinha et al., 2024; Dimri et al., 2024; Hossain et al., 2025; Kumar et al., 2025; Jena et al., 2025; Das et al., 2025). Despite the availability of modern medicine, traditional remedies remain a vital component of healthcare systems worldwide, particularly in rural areas and developing countries (Hebbbar et al., 2024; Rout et al., 2024; Sethi et al., 2024; Sharma et al., 2024). Their popularity stems from their efficacy, safety, and affordability. However, the emergence of drug-resistant diseases has underscored the need for novel therapeutic agents (Das et al., 2020; Das et al., 2022; Agarwal et al., 2023; Mukherjee et al.,

2024; Bhat *et al.*, 2024; Palei *et al.*, 2024; Sinha *et al.*, 2024). In this context, the exploration of medicinal plants like *Schleichera oleosa*, a member of the Sapindaceae family (Ghosh *et al.*, 2011). Commonly known as Kusum or lac tree, this large deciduous tree is native to the foothills of the Himalayas, India, Sri Lanka, and China (Alim *et al.*, 2022; Kumar *et al.*, 2022). Morphemically, it is a tree. Bark is 10-12 mm thick; surface is grey, smooth, and reddish-brown. Leaves paripinnate, alternate, exstipulate; rachis 5.5-11.5 cm, stout, glabrous, swollen at base; leaflets 4-6, opposite or sub opposite, slender, glabrous; lamina 5-15 x 1.8-4.5 cm, elliptic-oblong, ovate, base oblique or rarely obtuse, apex acute or obtuse, margin entire, coriaceous, glabrous; lateral nerves 10-23, parallel, prominent, intercostae reticulate, faint. Flowers polygamodioecious, 5-6 mm across, greenish-yellow, in axillary spicate panicles; male flowers: calyx lobes 5, valvate or obscurely imbricate; petals 0; disc complete, with the disc; stamens 7 or 8, free, inserted within the disc; filaments 1.5 mm, anthers oblong; small; bisexual flowers: ovary 2 mm, superior, 3-celled, ovule 1 in each cell; style rigid, terete; stigma 2 or 3 lobed. Fruit Drupe, 16-18 mm across, subcrustaceous, pointed, often echinate with stout rather blunt prickles; seed 1 or 2, enclosed in a pulpy aril which has a pleasant acid taste; testa smooth, brown (Saxena and Brahmam, 1994; Plate 1).



Plate 1: Leaves and bark of *S. oleosa*

For centuries, *S. oleosa* has been employed in traditional medicine to treat different health problems (Alim *et al.*, 2022; Nayak and Kumar, 2023). Present study aims to investigate the

phytochemical constituents present in the bark of *S. oleosa*, shedding light on its medicinal properties and pharmacological applications.

MATERIALS AND METHODS

The barks of *Schleichera oleosa* bark were collected from the Nuapada Village of Rairakhol subdivision of district Sambalpur, Odisha, India, (N 21.1213470 E 84.264237) in January 2025. Authors have identified the plant specimen. Bark extracts of Aqueous, ethanol and methanol were prepared and ten different bioactive compounds were detected using standard methods (Marndi *et al.*, 2024; Plate 2).

Qualitative phytochemical analysis: Detection of ten phytochemicals were conducted using standard methods.

Test for saponin: About 1 ml of the bark extract was taken and added with 1 ml of distilled water. After addition shaken it well and observed the persistent froth formation confirmed the presence of saponin.

Test for tannin: About 1 ml of the bark extract was taken. Added 3-5 drops of 10% lead acetate solution into it. The gelatinous precipitate formation confirmed the presence of tannin.

Test for flavonoids: About 1 ml of the bark extract was taken. Added 2 ml of 2% NaOH solution and 3 to 4 drops of dilute HCL. The colour initially turned to an intense yellow colour with NaOH solution and later became colourless. This change in colours confirmed the presence of flavonoids.

Test for terpenoids: About 1 ml of the filtrate was added with 6 drops of chloroform and place it in the water bath for few minutes. Then 6 drops of concentrated H₂SO₄ were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids.

Test for phenolic compounds: About 1 ml of the filtrate was taken. Few drops of 5% Ferric chloride solution were added. The dark bluish black provides the positive result of the test for phenolic groups.

Test for reducing sugars: About 1 ml of the bark extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept it in water bath for some time. The presence of red orange precipitate confirmed the presence of reducing sugar.

Test for steroids: About 1 ml of the bark extract was taken. 1 ml of chloroform and 1 ml of concentrated sulphuric acid was added into it. The appearance of upper red and lower yellow with green fluorescence provide the presence of steroids.

Test for alkaloids: About 1 ml of the bark extract was taken and added 3 to 4 drops of Dragendroff's reagent. The formation of reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds: About 1 ml of the bark extract was taken and added 3 to 4 drops of 2,4- Dinitrophenylhydrazine (DNPH) reagent. The formation of yellow crystal confirmed the presence of carbonyl compounds.

Test for Amino acids: 3 ml of extract is added with 3 drops of 5% ninhydrin solution and heated in water bath for 10 min. The presence of amino acids is shown by appearance of purple or blue colour.



Plate 2: Performing phytochemical tests

RESULTS AND DISCUSSION

The phytochemical analysis of *Schleichera oleosa* bark presented in [Table 1](#) revealed the presence of various bioactive compounds and secondary metabolites in three different types

of extracts. The aqueous, acetone, and ethanol extracts, all contain saponins, tannin, flavonoids and carbonyl compounds (Plate 3).

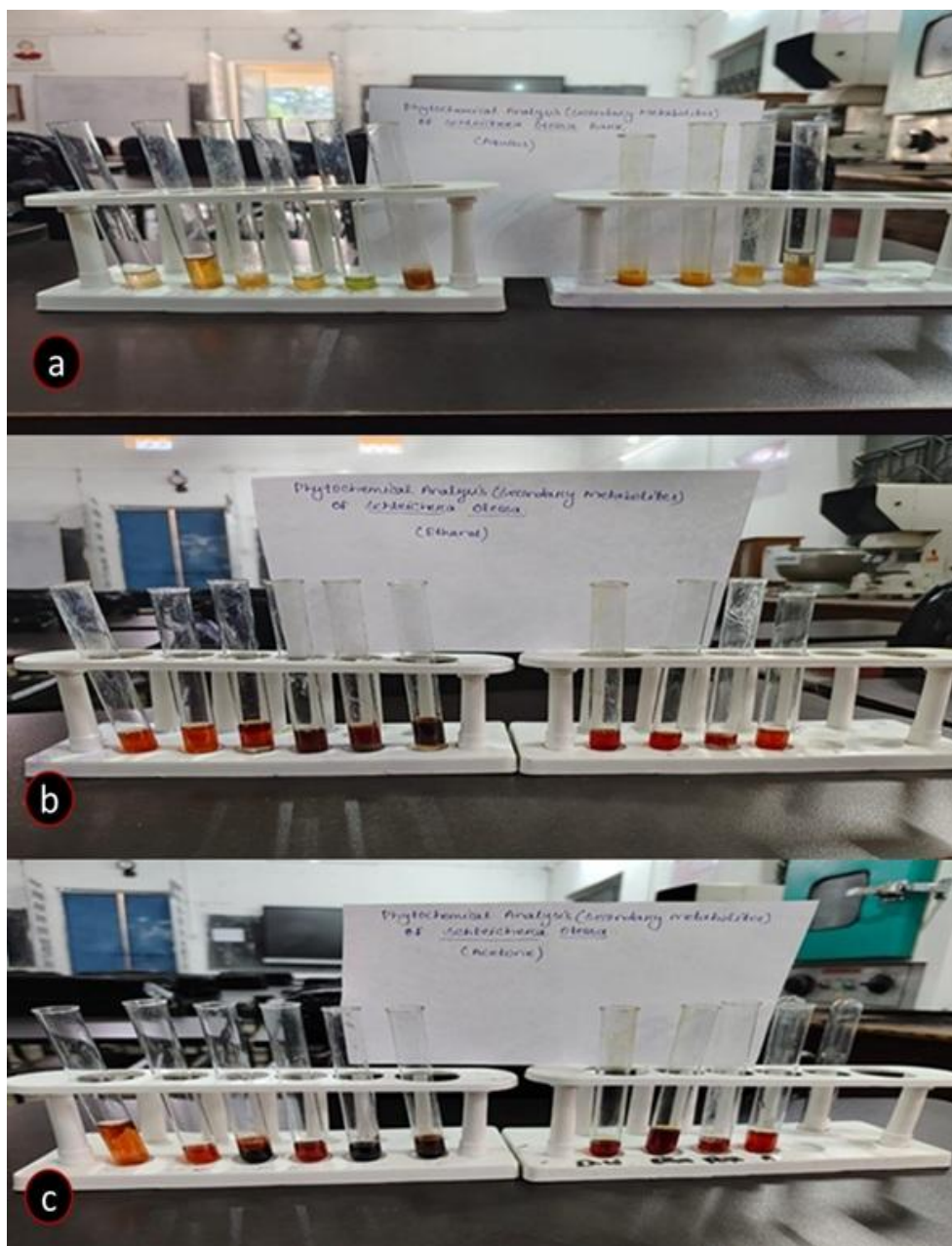


Plate 3: Phytochemical analysis of *S. oleosa*, a) aqueous extract, b) ethanol extract, c) acetone extract

Phenolic compounds, steroids and amino acids were not detected in all three extracts. However, terpenoids are only present in the acetone and ethanol extracts, while reducing sugars are only found in the ethanolic extract and alkaloids are only detected in aqueous extract. These findings suggested that *S. oleosa* bark is a rich source of phytochemicals with potential medicinal applications. The presence of tannins, saponins, flavonoids, phenolic compounds, reducing sugars, steroids, and alkaloids suggests that the bark may possess anticancer, antimicrobial, anti mutagenic, antioxidant, anti-diabetic, anti-inflammatory, and antifungal properties (Kumar *et al.*, 2013). These potential medicinal uses are supported by references to previous studies, indicating that *Schleichera oleosa* bark may be a valuable resource for the development of new medicines.

Table 1: Qualitative Phytochemicals Analysis of *Schleichera oleosa* Bark using three different extracts.

Phytochemicals	Extracts		
	Aqueous	Acetone	Ethanol
Saponins	+ve	+ve	+ve
Tannin	+ve	+ve	+ve
Flavonoids	+ve	+ve	+ve
Terpenoids	-ve	+ve	+ve
Phenolic Compounds	-ve	-ve	-ve
Reducing Sugars	-ve	-ve	+ve
Steroids	-ve	-ve	-ve
Alkaloids	+ve	-ve	-ve
Carbonyl Compounds	+ve	+ve	+ve
Amino Acids	-ve	-ve	-ve

(+ve: positive; -ve: negative)

CONCLUSION

The present study provides evidence of the phytochemicals profile of *Schleichera oleosa* bark, supporting its traditional use in medicines. The presence of various bioactive compounds, including tannins, saponins, flavonoids, and phenolic compounds contribute to the pharmacological properties. The present studies also suggested that *S. oleosa* bark may

be a valuable resource for the development of new therapeutic agents in future. Further research is needed for its proper applications in medicine.

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