

Chapter 1

Qualitative phytochemical analysis of *Schleichera oleosa* (Lour.) Oken fruits

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Abstract

The fruits of Kusum (*Schleichera oleosa*) were selected for qualitative phytochemical analysis as per their ethnomedicinal uses. The Soxhlet method was adopted for extraction using three solvents (aqueous, ethanol, and methanol). Results revealed that fruit extracts showed tannin, saponin, flavonoids, phenolic compounds and reducing sugar which validated its palatability and medicinal properties. Presence of above bioactive compounds make it a wild nutraceutical. Present study highlights the pharmacological importance of Kusum.

Keywords: Wild edible fruits, phytochemical screening, tree

Introduction

Wild, edible fruits are very common in rural and tribal areas. Some of them are very common, like Jamun (*Syzygium cumini*), Aam (*Mangifera indica*), Kathal (*Artocarpus heterophyllus*), etc., which are also seen in urban areas, but most of the wild edible plants are unexplored and limited to rural and tribal boundaries (Kumar *et al.*, 2021). These unexplored wild edible fruits are very important in mitigating the problems related to food scarcity and the source of new pharmaceuticals (Kumar *et al.*, 2012). Researchers are busy trying to find new sources of nutraceuticals, and in this aspect, wild edible plants can be a good choice for them. Keeping this in mind, an attempt has been made to document the bioactive compounds available in the fruits of Kusum. Kusum (*Schleichera oleosa*) is a common tree belonging to the

family Sapindaceae (Figures 1–3). Ripen fruits are edible in rural and tribal areas but unexplored by the urban populace.



Figure 1 : Unripe fruits of *S. oleosa*



Figure 2: Leaves of *S. oleosa*



Figure 3: Bark of *S. oleosa*

Fruits are also consumed by the birds and other wildlife. Seed oil is used as vegetable oil and for medicinal purposes in tribal areas. The present study highlights the importance of wild edible fruits as source of new pharmaceuticals.

Methodology

Collection of plant sample and preparation of extracts

The fruits of *S. oleosa* were collected from the Jamjhariya of Sundargarh district of Odisha state in April 2024 (Figure 4, Figure 6). The plant was identified by the senior author. The Soxhlet method of extraction was adopted using different solvents for phytochemical analysis (Rani *et al.*, 2024). Detection of nine secondary metabolites was carried out using standard methods (Chandra *et al.*, 2024; Mahendru *et al.*, 2024). An herbarium specimen is deposited to the Herbarium unit, Biodiversity and Conservation Lab, APRF, Cuttack in Odisha (Figure 5).

Qualitative phytochemical analysis

Test for tannin

About 1 ml of the filtrate of fruit extract was taken. Added about 3-5 drops of 0.1% lead acetate solution into it. The gelatinous precipitate formation confirmed the presence of tannin (Devi *et al.*, 2023).

Test for saponin

About 1 ml of the filtrate of fruit extract was taken and mixed with 1 ml of distilled water and allowed to shake it vigorously. The persistent froth formation after shaking confirmed the presence of saponin (Kumar *et al.*, 2013).

Test for flavonoids

About 1 ml of the filtrate of fruit extract was taken and added 2 ml of 2 % NaOH solution followed by H₂SO₄ into it. The colour initially turned to an intense yellow colour with the addition of NaOH solution and later become colourless with sulphuric acid. This change in colour confirmed the presence of flavonoids.

Test for terpenoids

About 2 ml of the filtrate of fruit extract 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 appearance of reddish-brown interface confirmed the presence of terpenoids (Misra *et al.*, 2012).

Test for phenolic compounds

About 1 ml of the filtrate of fruit extract was taken. Few drops of 5% Ferric chloride solution were added into the filtrate extract. The appearance of bluish black colour provides the positive result of the phenolic compounds (Kumar and Jena, 2014).



Figure 4: Collection of *S. oleosa* fruits in the field



Figure 5: Herbarium specimen of *S. oleosa*



Figure 6: Dried fruits of *S. oleosa* for experimental work

Test for reducing sugar

About 1 ml of the filtrate of fruit 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 few minutes. The presence of red orange precipitate confirmed the positive result of the test for reducing sugar.

Test for steroids

About 1 ml of the filtrate of fruit 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 positive result for the presence of steroids (Swain *et al.*, 2020).

Test for alkaloids

About 1 ml of the filtrate of fruit 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 filtrate of fruit extract was taken and added 3 to 4 drops of 2,4- Di-nitrophenylhydrazine reagent. The formation of yellow crystal confirmed the presence of carbonyl compounds.

Results and discussion

Qualitative analysis of phytochemical screening revealed that tannin, saponin, flavonoids, phenolic compounds, reducing sugar and alkaloids are present in aqueous extract. In methanol extract, tannin, saponin, flavonoids, phenolic compounds, reducing sugar, steroids and alkaloids are detected. In ethanol extract, tannin, saponin, flavonoids, phenolic compounds and reducing sugars are observed (Table 1; Figures 7-9).

Table 1: Phytochemical screening using different extracts of *S. oleosa* fruits

Bioactive compounds	Aqueous	Methanol	Ethanol
Tannin	+ve	+ve	+ve
Saponin	+ve	+ve	+ve
Flavonoids	+ve	+ve	+ve
Terpenoids	-ve	-ve	-ve
Phenolic compounds	+ve	+ve	+ve
Reducing sugar	+ve	+ve	+ve
Steroids	-ve	+ve	-ve
Alkaloids	+ve	+ve	-ve
Carbonyl compounds	-ve	-ve	-ve

(+ve: positive; -ve: negative)

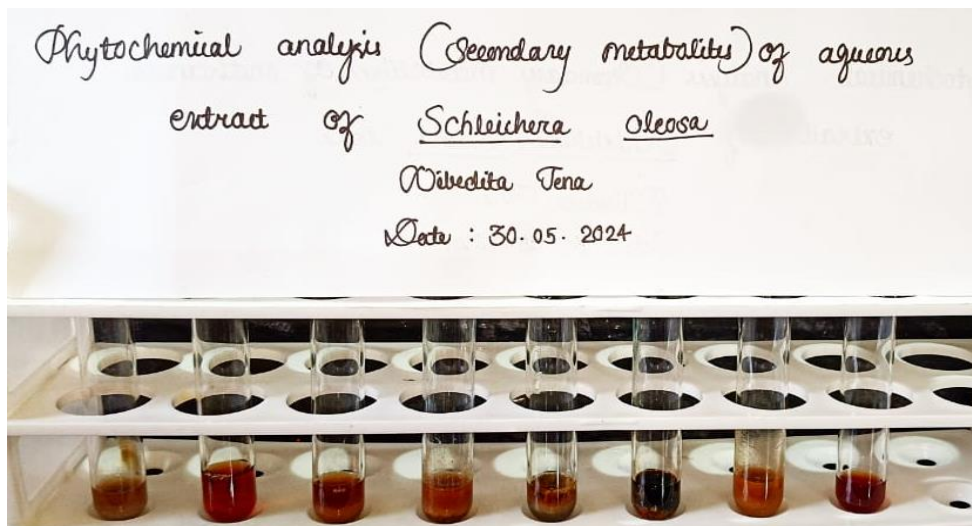


Figure 7: Screening of secondary metabolites using aqueous extract of *S. oleosa* fruits

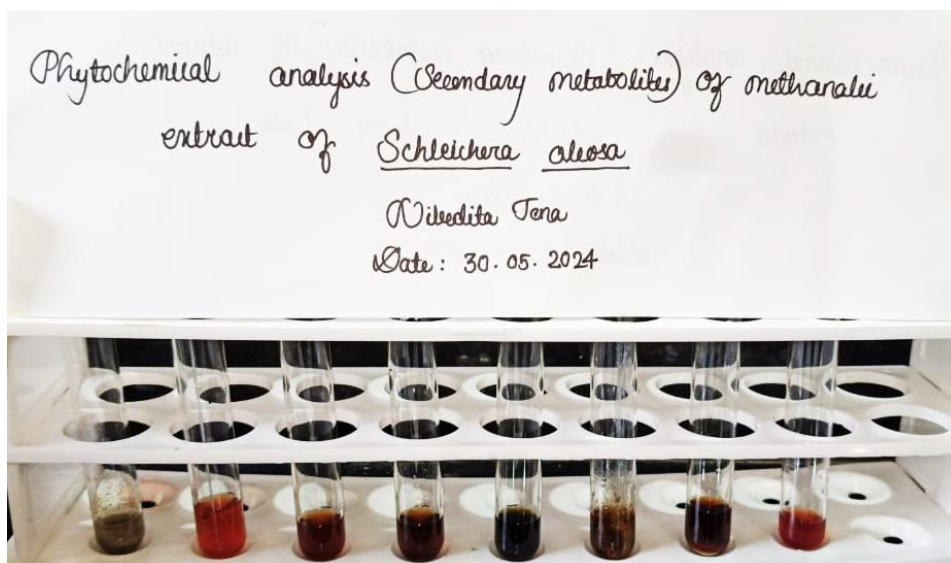


Figure 8: Detection of secondary metabolites using methanolic extract of *S. oleosa* fruits

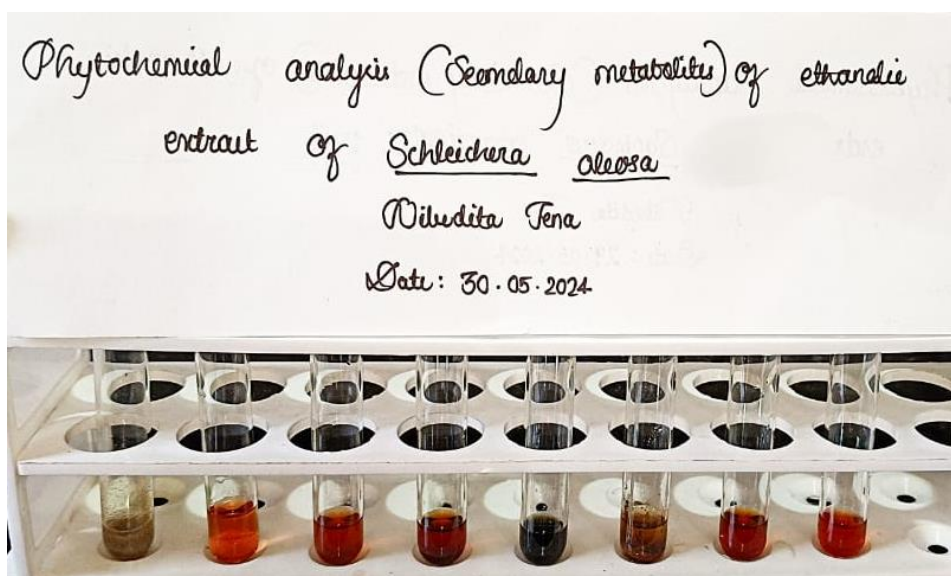


Figure 9: Detection of secondary metabolites using ethanolic extract of *S. oleosa* fruits

Conclusion

Kusum is an important edible wild fruit from India that has traditional therapeutic uses. In rural and tribal communities, Kusum fruits are commonly consumed. Its bioactive compounds have been shown to exhibit pharmacological properties, but

further research is necessary, as well as more sophisticated pharmacological activities and an assessment of the substance's nutritional and ecological values.

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