CHAPTER 6

Phytochemical evaluation of *Salvinia cucullata* Bory (Salviniaceae) for medicinal values

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Abstract: A qualitative phytochemical analysis of *Salvinia cucullata* was carried out, and the results are presented here to draw attention to its potential as a raw material for the extraction of bioactive compounds. Results revealed that it is rich with tannin, saponin, phenolic compounds, and reducing sugar. Hence, *S. cucullata* can be used as a raw material to extract the mentioned bioactive compounds.

Keywords: *Salvinia cucullata,* invasive weed, aquatic, phytochemical, tannins.

Introduction

Salvinia cucullata is commonly known as Asian water moss. It is a floating fern which is native to South America and the West Indies (https://www.aquasabi.com/Salvinia-cucullata). It belongs to the family Salviniaceae (https://powo.science.kew.org) and the genus was described by Sanguier in 1754 (*Pl. Veron.* 3: 52. 1754). It is an introduced aquatic weed in India and is creating a lot of problems. It grows very fast and covers the water as a thick mat which blocks the light from reaching under the water (Jampeetong *et al.,* 2012; Figure 1). It damages the aquatic ecosystem and replace the local plants which provide food and habitat for native taxa. It has a high tolerance and can also grow in highly polluted water. To control the population of *S. cucullata*, researchers should make it a source of economic stuff. Therefore, to highlight its pharmacological values, an attempt has been made to detect available secondary metabolites through phytochemical screening, it could be a raw source for the extraction of some bioactive constituents.

Methodology

Collection of the plant sample and preparation of extracts

The leaves of *S. cucullata* were collected from the Mahanadi River, Cuttack, Odisha, India in July 2024 (Figure 2). The plant species was identified by the senior author. The Soxhlet extraction method was adopted using different solvents for phytochemical analysis (Soni *et al.,* 2024). Detection of nine secondary metabolites from the collected flowers of *S. cucullata* was carried out using standard methods (Sharma *et al.,* 2024).

Qualitative phytochemical analysis

Detection of nine secondary metabolites were conducted using standard methods (Marndi *et al.,* 2024).

Test for tannin

About 1 ml of the extract was taken. 3-5 drops of 10% lead acetate solution were added to it. The gelatinous precipitate formation confirmed the presence of tannin (Jena *et al.,* 2024).

Test for saponin

About 1 ml of the extract was taken and 1 ml of distilled water was added and shaken well. The formation of persistent froth was observed confirming the presence of saponin (Devi *et al.,* 2023).

Test for flavonoids

About 1 ml of the extract was taken. 2 ml of 2% NaOH solution and 3 to 4 drops of dilute HCL were added to it. The colour initially turned to an intense yellow colour with NaOH solution and later turned colourless. This colour change confirmed the presence of flavonoids (Mety *et al.,* 2024).

Test for terpenoids

About 1 ml of the filtrate was added with 6 drops of chloroform and placed in the water bath for a few minutes. Then 6 drops of concentrated H_2SO_4 were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids (Dimri *et al.,* 2024).

Test for reducing sugars

About 1 ml of the extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept in the water bath for some time. The presence of red-orange precipitate confirmed the presence of reducing sugar (Tripathi *et al.,* 2024).



Figure 1: Habitat of *S. cucullata*



Figure 2: Collection of leaves of *S. cucullata*

Test for phenolic groups

About 1 ml of the filtrate was taken. A few drops of 5% ferric chloride solution were added. The dark bluish-black provides the positive result of the test for phenolic groups (Topno *et al.,* 2024).

Test for steroids

About 1 ml of the 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 provides the presence of steroids (Vajha *et al.,* 2024).

Test for alkaloids

About 1 ml of the extract was taken and added 3 to 4 drops of Dragendroff's reagent. The formation of a reddish-brown precipitate confirmed the presence of alkaloids (Tallur *et al.,* 2024).

Test for carbonyl compounds

About 1 ml of the 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 (Das *et al.,* 2024).

Results and discussion

S. cucullata is a problem for our aquatic ecosystems and it should be controlled. In this view, the qualitative analysis of secondary metabolites are carried out and it was noticed that saponin is detected in aqueous extract wheresas tannin, saponin, phenolic compounds and reducin sugars are present in ethanol extract. In acetone extract, tannin, phenolic compounds and reducing sugar are detected (Table 1). Santosh *et al.,* (2022) documnted phytochemicals, antioxidant, antibacterial activity, and profiling of functional molecules in novel freshwater fern *Salvinia cucullata.* Kumar and Kumar, (2023) documented the secondary metabolites of *S. molesta.* Very less reports are available on this fern.

Table 1: Phytochemical screening of secondary metabolites using different extracts of *S. cucullata* leaves

Bioactive compounds	Aqueous	Ethanol	Acetone
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)

Conclusion

In order to highlight *Salvinia cucullata*'s potential as a raw material for the extraction of secondary metabolites, a qualitative phytochemical analysis of the plant was conducted in the present study. The results are presented in this chapter. The findings showed that it contains significant amounts of reducing sugar, tannin, saponin, and phenolic chemicals. Therefore, the aforementioned bioactive chemicals can be extracted from *S. cucullata* using it as a raw material.

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