

Chapter 2

Ethnobotanical and phytochemical study of *Senna occidentalis* (L.) Link seeds

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Abstract

Phytochemical screening of *Senna occidentalis* seeds was carried out and the results are presented in this chapter. Seeds are collected from semi-urban areas of Cuttack and Soxhlet method is used for extraction. The results of phytochemical screening showed the presence of tannin, phenolic compounds, reducing sugar and alkaloids. The detected secondary metabolites could be useful to treat many health problems which is reflected through its ethnomedicinal uses. Further, more experimental works are needed to show its pharmacological potentials.

Keywords: Local medicinal plants, phytochemistry, conservation

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Introduction

Senna occidentalis is a common undershrub in Odisha and Chhattisgarh states of India. The local tribal people use them for various purposes. Leaves and seeds are used to treat joint pain. Seeds paste is also used to treat skin infections (Jogdand *et al.*, 2024). Authors observed that the population of *Senna occidentalis* are declining due to anthropogenic activities and it is treated as weeds in urban and semi-urban areas. Therefore, for the conservation of this important local plants, authors collected seeds and phytochemical analysis was carried out to draw attention towards its

medicinal importance and conservation of this important locally available plant of the states.

Methodology

Collection of seeds and preparation of plant extract

Maceration method of extraction was adopted to obtain the plant extracts for phytochemical analysis. The seeds of *S. occidentalis* were collected from the field nearby Mahanadi River area (N 20° 29.08'; E 85° 48.54" elevation 35 msl; Figure 1-3) along roadsides of Cuttack district, Odisha and dried at room temperature, under shed conditions and were powdered after drying using mechanical devices. The powder was kept in a close container for further experimental works (Kumar *et al.*, 2013; Devi *et al.*, 2023).

Qualitative analysis of bioactive compounds

Phytochemical analysis was carried out on aqueous extract of *S. occidentalis* using standard procedure (Valigatla *et al.*, 2024; Figure 4) to identify the bioactive compounds present in the plant (Kumar and Jena, 2014).

Test for Tannin

1 ml of filtrate of the seeds extract was taken, three drops of 0.1% of lead acetate solution was added to it. The creamy gelatinous precipitate provides the positive result of the presence of tannins (Jaiswal *et al.*, 2024).

Test for saponin

1 ml filtrate of the seeds extract was mixed with 1 ml of distilled water and shaken it vigorously. The persistent froth formed after shaking provide the evidence of the saponin (Sharma *et al.*, 2024a).

Test for flavonoids

1 ml filtrate of the seeds extract was taken and added 2 ml of 2% NaOH solution and 3 drops of dilute HCL. The colour initially turned an intense yellow colour with NaOH solution and later became colourless. This change in colour confirmed the positive result for the presence of flavonoids (Kumar *et al.*, 2024).

Test for terpenoids

2 ml of the filtrate of seeds extract was used and 6 drops of chloroform was added and placed it in the water bath for few minutes.



Figure 1: Collection of seeds from field



Figure 2: Fruits of *S. occidentalis*



Figure 3: Seeds of *S. occidentalis*

Then, 6 drops of concentrated H_2SO_4 were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids (Sharma *et al.*, 2024b).

Test for phenolic compounds

1 ml of the filtrate of seed extract was taken. Few drops of 5% Ferric chloride solution were added. The dark bluish black colour provides the positive result of the test of phenolic compounds (Sharma *et al.*, 2024c).

Test for reducing sugar

1 ml of filtrate of the seed extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B was added and put it in the water bath for some time. The formation of red orange precipitate confirmed the positive result of the test for reducing sugar (Sinha *et al.*, 2024).

Test for steroids

1 ml of filtrate of the seed extract was used. 1 ml chloroform and 1 ml of conc. H_2SO_4 was added into it. The presence of upper red and lower yellow with green fluorescence provide the positive result of the test of steroids (Sharma *et al.*, 2024d).

Test for alkaloids

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

Test for carbonyl compounds

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



Figure 4: Phytochemical screening of *S. occidentalis* seeds

Results and discussion

Food values

In some developing countries, the roasted seeds of *S. occidentalis* may be used as a coffee substitute (Gebrelibanos *et al.*, 2014).

Ethnomedicinal uses

One type of tea made from roots and dried flowers is used as a treatment for colds and upset stomach. A paste prepared from the leaves is applied as a remedy for ringworm and other affections on the skin like eczema and leishmaniasis (Panda and Mishra, 2023).

Pharmacological properties

The seed of *S. occidentalis* has some medicinal uses as these are brewed into the coffee-like beverage which is used for asthma. Previous pharmacological studies showed that the leaf extracts of *S. occidentalis* have broad spectrum antibacterial, antimalarial, and antifungal (Nassar *et al.*, 2013).

Phytochemical analysis

Table 1: Phytochemical analysis (secondary metabolites) of aqueous extract of *Senna occidentalis* seeds.

Bioactive compounds	Seeds
Tannin	+
Saponin	~
Flavonoids	~
Terpenoids	~
Phenolic compounds	+
Reducing sugars	+
Steroids	~
Alkaloids	+
Carbonyl compounds	~

(+: positive; -: negative)

From the result table, it was noticed that the seeds of *S. occidentalis* possesses several bioactive compounds including tannin, phenolic compounds, reducing sugars, alkaloids etc. The presence of several constituents indicates the pharmacological potential of *S. occidentalis*.

Discussion

The phytochemical compounds present in the extract of *S. occidentalis* was found to have several pharmacological properties including, antidiabetic (Issa *et al.*, 2020), phenolic compounds possess antioxidant effects (Monteiro *et al.*, 2018), reducing sugar responsible for hepatoprotective activity (Mogaka *et al.*, 2023) and presence of alkaloids indicates diuretic activity (Thawabteh *et al.*, 2019).

Conclusion

The present study on phytochemical investigation and ethnomedicinal use of *S. occidentalis* highlights its medicinal significance. Further experimental works on the other plant parts of *S. occidentalis* are needed to evaluate the chemical compounds present which could be responsible for its biological activities for future pharmaceuticals as well as sustainable utilization and conservation.

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