

Chapter 8

Phytochemical analysis of seeds of *Abrus precatorius* L. (Fabaceae)

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Abstract: *Abrus precatorius*, a plant traditionally used in medicine, was analysed for its phytochemical constituents. Seeds of the plant were extracted using n-hexane, ethanol, and aqueous solvents, and the resulting extracts were screened for bioactive compounds. The phytochemical analysis revealed the presence of tannins, saponins, flavonoids, phenolic compounds, reducing sugars, and alkaloids in the seeds. The findings of this study suggest that *A. precatorius* seeds possess a rich phytochemical profile, which may contribute to their traditional medicinal uses and potential pharmacological activities. Further studies are needed to isolate and characterize the specific compounds responsible for the plant's bioactive properties.

Keywords: Bioactive compounds, Fabaceae, pharmacology

INTRODUCTION

Climbing plants, including vines and lianas, have been a rich source of medicinal agents for centuries (Sethi *et al.*, 2023; Sharma *et al.*, 2024). These plants have evolved unique adaptations to thrive in a variety of environments, and many have developed bioactive compounds to protect themselves from pathogens, insects, and other predators (Burris *et al.*, 2018). As a result, climbers have been used as traditional medicinal agents (Khillar *et al.*, 2022; Vijayvargiya and Shrivastava, 2023; Sharma *et al.*, 2024).



Figure 1: Seeds of *Abrus precatorius*

One such climber is *Abrus precatorius* L., (Figure 1) commonly known as Jequirity or Rosary pea belonging to the family Fabaceae (Nayak and Kumar, 2023). Seeds have been used in the treatment of various diseases (Nayak and Kumar, 2023). Therefore, the present study aimed to investigate the phytochemical constituents of *A. precatorius* seeds using three different solvents. Present study provides a comprehensive analysis of the bioactive compounds present in the seeds and lays the foundation for further research into the plant's medicinal properties and potential pharmacological applications.

METHODOLOGY

The seeds of *Abrus precatorius* were collected from Rourkela Forest Division, Odisha, India (Figure 2). The plant species was identified by authors using flora book of the state (Saxena and Brahmam, 1994). The phytochemical analysis was carried out using different solvents by using standard methods of phytochemical screening (Kumar *et al.*, 2013; Kumar and Jena, 2014; Devi *et al.*, 2023; Jaiswal *et al.*, 2024; Marndi *et al.*, 2024; Hossain *et al.*, 2025).



Figure 2: Collection of seeds of *A. precatorius*

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

Test for saponin: About 1 ml of the seeds extract was taken and 1 ml of distilled water was added and shaken well. The persistent froth formation confirmed the presence of saponin.

Test for flavonoids: About 1 ml of the seeds extract was taken. Added 2 ml of 2% NaOH solution and then dilute HCl to it. The colour initially turned to an intense yellow with NaOH

solution and later became colourless. This colour changing transformation confirmed for the presence of flavonoids.

Test for terpenoids: About 1 ml of the seeds filtrate was added with 6 drops of chloroform and placed in the water bath for a few minutes. Then 6 drops of concentrated sulphuric acid were added. The appearance of reddish-brown interface confirmed the presence of terpenoids.

Test for phenolic compounds: About 1 ml of the seeds extract was taken and added few drops of 5% ferric chloride solution to it. The dark bluish black appearance confirmed the presence of phenolic compounds.

Test for reducing sugars: About 1 ml of the seeds extract was taken and 2-3 drops of Fehling's solution A and B were respectively added. Then kept in the 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 seeds extract was taken. 1 ml of chloroform and 1 ml of concentrated sulphuric acid was added into it. The appearance of 2 phases with the upper red and lower yellow with green fluorescence confirmed the presence of steroids.

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

RESULTS AND DISCUSSION

The phytochemical analysis of *Abrus precatorius* seeds revealed a diverse range of bioactive compounds. The phytochemical screening of *A. precatorius* seeds revealed the presence of alkaloids, glycosides, flavonoids, phenolic compounds, and reducing sugars (Figures 3-5). The results are summarized in Table 1. The presence of alkaloids, glycosides, flavonoids, phenolic compounds, and reducing sugars in *A. precatorius* seeds is consistent with previous reports on the plant's phytochemical constituents. The bioactive compounds present in the

seeds may contribute to the plant's medicinal properties, including its anti-inflammatory, antimicrobial, and antioxidant activities.

Table 1: Phytochemical analysis of seeds of *Abrus precatorius* using different extracts

Bioactive compounds	n-hexane extract	Ethanol extract	Aqueous extract
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: Presence; -ve: Absence)

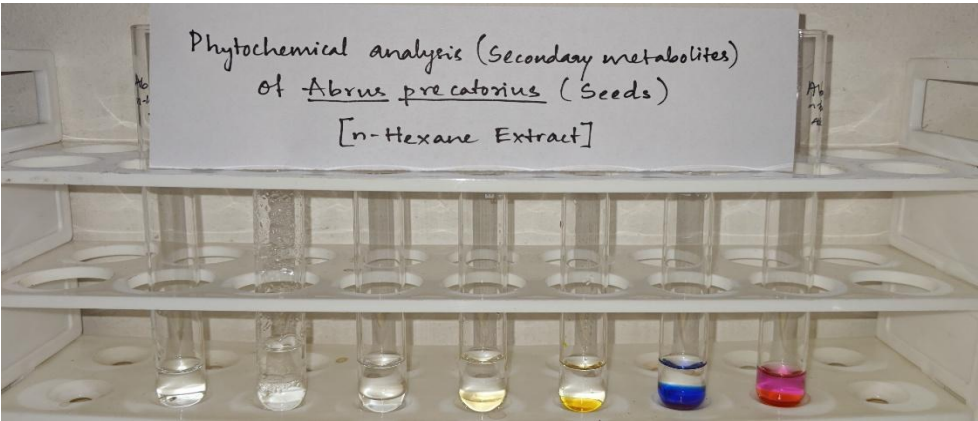


Figure 3: Phytochemical analysis of *A. precatorius* seeds using n-hexane extract

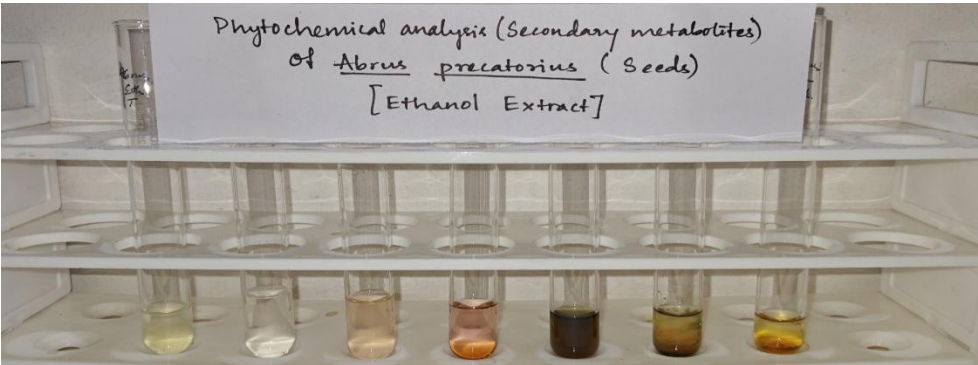


Figure 4: Phytochemical analysis of *A. precatorius* seeds using ethanol extract

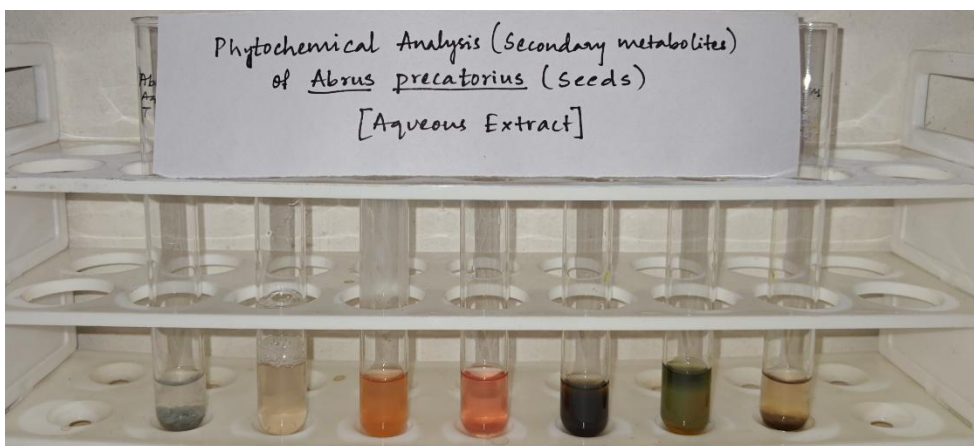


Figure 5: Phytochemical analysis of *A. precatorius* seeds using aqueous extract

The alkaloids present in *Abrus precatorius* seeds may be responsible for the plant's toxic properties (Karthikeyan and Amalnath, 2017). Abrin, a toxic compound isolated from the seeds, has been reported to have anti-tumor and anti-viral activities (Peng *et al.*, 2022). The glycosides present in the seeds may contribute to the plant's medicinal properties (Fu *et al.*, 2008). Flavonoids, which are known for their antioxidant and anti-inflammatory activities, may also contribute to the plant's medicinal properties (Panche *et al.*, 2016). The phenolic compounds present in the seeds may have also pharmacological potentials (Sun and Shahrajabian, 2023).

CONCLUSION

The phytochemical analysis of *Abrus precatorius* seeds revealed a diverse range of bioactive compounds, including alkaloids, glycosides, flavonoids, phenolic compounds, and reducing sugars. The bioactive compounds present in the seeds may contribute to the plant's medicinal properties, including its anti-inflammatory, antimicrobial, and antioxidant activities. Further studies are needed to isolate and characterize the specific compounds responsible for the plant's medicinal properties.

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