

## CHAPTER 3

### Qualitative phytochemical analysis of *Solanum virginianum* L. flower: a medicinal plant of India

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**Abstract:** Qualitative phytochemical screening of *Solanum virginianum* flowers was carried out, and the results revealed that tannin and saponin were commonly present in all three extracts (aqueous, methanol, and ethanol), whereas reducing sugar and terpenoids were only present in methanol and ethanol extracts, respectively. The presence of these phytochemicals indicates the pharmacological potential of *S. virginianum* flowers. Further research studies on the bioactive compounds present in *S. virginianum* flowers are needed to highlight their biological activities, which can be useful in the development of future pharmaceutical products.

**Keywords:** Bioactive compounds, biological activity, pharmacological potential

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#### Introduction

Traditional therapeutic systems have been given knowledge about lot of locally available medicinal plants (Devi *et al.*, 2023). They are native to the region and fit for the environment and biotic & non-biotic stress. Due to such properties, they develop naturally some compounds as defence mechanism and human use them as therapeutic agents (Nayak and Kumar, 2023). Unfortunately, local medicinal plants are declining due to increase population of invasive species and lack of awareness among the populace of the region. Such species are lot in number in different parts of India and world. Among them, *Solanum virginianum* (Figure 1), a very popular medicinal agent in Indian Ayurveda but now its limited to the Ayurvedic and traditional healers. Youth and population of urban and semi-urban areas are going to forget about its significance. Keeping this in view, an attempt has been made to document the bioactive compounds of flowers of *S. virginianum* (Figure 2) through phytochemical analysis. Fruits have lot of reports but less reports are observed in

the flowers. Therefore, present study highlights the importance of flowers in pharmacological aspects of this popular Indian medicinal plant.

## Methodology

### Collection of plant sample and preparation of extracts

The flowers of *Solanum virginianum* were collected from the roadsides of CDA 13 of Cuttack district of Odisha state in June 2024 (Figure 3; Tallur *et al.*, 2024). The plant was identified by the senior author.



Figure 1: Habitat of *S. virginianum* in wild



Figure 2: Flowers and leaves of *S. virginianum*



Figure 3: Collection of flowers of *S. virginianum* for experimental work

The Soxhlet method of extraction was adopted using different solvents for phytochemical analysis. Detection of nine secondary metabolites was carried out using standard methods (Dimri *et al.*, 2024; Jena *et al.*, 2024; Metý *et al.*, 2024; Topno *et al.*, 2024; Tripathi *et al.*, 2024; Das *et al.*, 2024; Behera *et al.*, 2024; Mahendru *et al.*, 2024; Rani *et al.*, 2024).

**Results and discussion**

Results of phytochemical screening revealed that tannin and saponin were present in aqueous extract of *S. virginianum* flowers (Table 1; Figure 4). Tannin, saponin and reducing sugar were detected in methanolic extract of flowers (Table 1; Figure 5) while tannin, saponin, terpenoids and reducing sugar were present in ethanol extract of flowers of *S. virginianum* (Table 1; Figure 6). Other researchers have also reported the medicinal values of plant parts of *S. virginianum* but less reports on flowers. Kumar *et al.*, (2012) studied about the phytochemicals of *Solanum xanthocarpum*. Muruhan *et al.*, (2013) have investigated the pharmaceutical properties of *Solanum* species. Kumar *et al.*, (2014) also reported about the food and medicinal values of *S. virginianum* fruit. Elizalde *et al.*, (2021) also reported the phytochemicals of *Solanum* species. Sahu *et al.*, (2023) studied about the pharmacological potentials of *S. virginianum* for the treatment of psoriasis.

**Table 1:** Phytochemical screening of secondary metabolites using different extracts of *S. virginianum* flowers

| 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 4: Detection of secondary metabolites using aqueous extract of *S. virginianum* flower



Figure 5: Detection of secondary metabolites using ethanolic extract of *S. virginianum* flower



Figure 6: Detection of secondary metabolites using acetone extract of *S. virginianum* flower

## Conclusion

The study concludes that a lot of work has been carried out on the fruits, leaves, and roots of *S. virginianum*. It was noticed that fewer reports are available on the flowers. Therefore, the present study recommends doing more exploration, followed by pharmacological activities of the flowers of *S. virginianum*.

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