



Original Article

From Forest to Farm: Phytochemical Evaluation of *Amorphophallus campanulatus* from the Melghat Region for Sustainable Cultivation and Biodiversity Conservation

Pranjali K. Wajge<sup>1</sup> & Dr. Tushar B. Wankhede<sup>2</sup>

<sup>1</sup>Department of Botany, Shri Shivaji Science College, Amravati

<sup>2</sup>J. D. Patil Sangludkar Mahavidyalaya, Daryapur

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Corresponding Author:  
Pranjali K. Wajge  
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**Abstract:**

The Melghat region of Maharashtra, India, located in the Satpura ranges, harbors a rich diversity of medicinal plants traditionally utilized by tribal communities. *Amorphophallus campanulatus* (Elephant foot yam) is one such ethnomedicinally important species known for its therapeutic and nutritional value. The present study was undertaken to evaluate the qualitative phytochemical composition of *A. campanulatus* collected from the Melghat forest region to assess its bioactive potential and suitability for sustainable cultivation. Ethanolic, methanolic, and aqueous extracts of the plant material were subjected to standard phytochemical screening for secondary metabolites such as alkaloids, flavonoids, phenolic compounds, tannins, saponins, terpenoids, and cardiac glycosides. The results revealed a strong presence of alkaloids, flavonoids, phenolics, tannins, and terpenoids across all solvent extracts, while saponins and cardiac glycosides were absent. The richness of bioactive compounds suggests significant antioxidant and antimicrobial potential. These findings support the promotion of *A. campanulatus* for large-scale cultivation in the Melghat region, contributing to biodiversity conservation and enhancing livelihood opportunities for local communities.

**Keywords:** *Amorphophallus campanulatus*, Phytochemical Screening, Melghat Region, Medicinal Plants, Secondary Metabolites, Sustainable Cultivation.

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## Introduction:

Medicinal plants form the backbone of traditional healthcare systems and continue to play a crucial role in modern pharmacology. India, being one of the world's biodiversity-rich countries, possesses a vast repository of medicinal flora. The Melghat region of Maharashtra, situated in the Satpura mountain ranges, is recognized as a biodiversity hotspot with a high concentration of medicinal plant species traditionally used by indigenous tribal communities.

*Amorphophallus campanulatus* (Roxb.) Blume, commonly known as Elephant foot yam, is a perennial tuberous plant belonging to the family Araceae. It is widely used in traditional medicine for the treatment of piles, dysentery, inflammation, digestive disorders, and tumors. Despite its ethnomedicinal importance, indiscriminate harvesting from wild populations has raised concerns regarding its long-term conservation.

Phytochemicals are bioactive secondary metabolites such as alkaloids, flavonoids, phenolic compounds, tannins, terpenoids, and

## 2. Plant Collection and Identification:



saponins that are responsible for the therapeutic properties of medicinal plants. Qualitative phytochemical screening provides preliminary information about the chemical nature of plant extracts and helps identify species with high pharmacological potential.

The present study focuses exclusively on the phytochemical evaluation of *Amorphophallus campanulatus* collected from the Melghat region. By documenting its phytochemical profile, the study aims to support its sustainable cultivation, reduce pressure on forest resources, and promote medicinal plant-based livelihoods.

## Materials and Methods:

### 1. Study Area:

The study was conducted in the Melghat region of Amravati district, Maharashtra, India. The region lies between latitudes 21°15'–21°45' N and longitudes 77°00'–77°30' E. It is characterized by tropical dry deciduous forests, annual rainfall ranging from 1000–1500 mm, and elevations between 300–1200 m above sea level.



Healthy plant specimens of *Amorphophallus campanulatus* were collected from forest patches of the Melghat region. The collected plant material was authenticated at a recognized herbarium, and vernacular as well as botanical identification was confirmed.

### 3. Preparation of Extracts:

The collected plant material was thoroughly washed with distilled water, shade-

dried, and powdered using a mechanical grinder. Ten grams of powdered sample was extracted separately with 100 mL of ethanol, methanol, and distilled water using Soxhlet extraction for 6–8 hours. The extracts were filtered and concentrated using a rotary evaporator and stored at 4°C until further analysis.



### 4. Phytochemical Screening:

Qualitative phytochemical analysis was carried out using standard procedures as described by Harborne (1998) and Trease and Evans (2002). The extracts were screened for the presence of:

- **Alkaloids** (Mayer's and Wagner's tests)
- **Flavonoids** (Shinoda test)
- **Phenolic compounds** (Ferric chloride test)
- **Tannins** (Gelatin test)
- **Saponins** (Foam test)
- **Terpenoids** (Salkowski test)
- **Cardiac glycosides** (Keller–Killiani test)

The intensity of phytochemicals was recorded as absent (–), weak (+), moderate (++), or strong (+++).

### Results:

#### 1. Phytochemical Screening of *Amorphophallus campanulatus*:

The qualitative phytochemical analysis revealed that *Amorphophallus campanulatus* contains a wide range of secondary metabolites. Ethanolic and methanolic extracts showed stronger reactions compared to aqueous extracts.



**Table 1. Phytochemical Profile of *Amorphophallus campanulatus***

| Phytochemical      | Ethanollic Extract | Methanolic Extract | Aqueous Extract |
|--------------------|--------------------|--------------------|-----------------|
| Alkaloids          | +++                | +++                | +++             |
| Flavonoids         | +++                | +++                | ++              |
| Phenolic compounds | +++                | +++                | ++              |
| Tannins            | +++                | +++                | ++              |
| Saponins           | –                  | –                  | –               |
| Terpenoids         | ++                 | ++                 | +               |
| Cardiac glycosides | –                  | –                  | –               |

### Discussion:

The present study confirms that *Amorphophallus campanulatus* is rich in bioactive secondary metabolites, particularly alkaloids, flavonoids, phenolic compounds, tannins, and terpenoids. The strong presence of alkaloids suggests potential antimicrobial and anti-inflammatory properties, while phenolic compounds and flavonoids are well known for their antioxidant activity.

The absence of saponins and cardiac glycosides indicates that the medicinal value of *A. campanulatus* is primarily attributed to phenolic and alkaloid-rich compounds. The higher efficiency of ethanolic and methanolic solvents observed in this study aligns with previous reports that organic solvents extract a broader range of phytochemicals compared to aqueous solvents.

Given its strong phytochemical profile and adaptability to the agro-climatic conditions of Melghat, *Amorphophallus campanulatus* emerges as a promising candidate for cultivation. Encouraging its controlled farming would reduce pressure on wild populations, ensure consistent quality raw material for herbal industries, and provide an additional income source for local farmers.

### Conclusion:

The qualitative phytochemical analysis of *Amorphophallus campanulatus* from the Melghat region demonstrates the presence of significant secondary metabolites such as alkaloids, flavonoids, phenolic compounds, tannins, and terpenoids. Ethanolic and methanolic extracts were more effective in extracting bioactive constituents than aqueous extracts.

The richness of phytochemicals supports the traditional medicinal use of *A. campanulatus* and highlights its potential for pharmaceutical applications. Sustainable cultivation of this species in the Melghat region can play a vital role in biodiversity conservation while simultaneously improving the socio-economic status of local communities.

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