
Review Article

Medicinal and ecological significance of *Tacca leontopetaloides* (Dioscoreaceae): a less known ethnomedicinal aroid of Odisha, India

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Abstract: *Tacca leontopetaloides* (L.) Kuntze, is a neglected yet valuable tropical plant recognized for its ecological adaptability, ethnomedicinal importance, and potential as an alternative food source. Although widely distributed across tropical Asia, Africa, and the Pacific Islands, the species remains poorly documented in comparison with other medicinal plants. Present study synthesizes the published information on its taxonomy, habitat, morphology, traditional uses, phytochemistry, pharmacological properties, and ecological significance, supplemented with original field observations and photographic documentation from natural populations. Literature indicates that the tubers serve as an emergency food source after detoxification and are traditionally used for treating gastrointestinal disorders, wounds, and parasitic infections. Phytochemical investigations have revealed the presence of flavonoids, alkaloids, steroidal saponins, taccalonolides, terpenoids, and phenolic compounds with antimicrobial, antioxidant, antiparasitic, and anticancer activities. Ecologically, the species contributes to forest-floor biodiversity and survives seasonal drought through its underground tuber. Considering its nutritional value, medicinal potential, and resilience under changing climatic conditions, *T. leontopetaloides* deserves greater attention for conservation, sustainable utilization, and future pharmaceutical research.

Keywords: Anticancer compounds, biodiversity conservation, ethnobotany

Introduction

Neglected and underutilized plant species have increasingly attracted scientific attention because of their contributions to food security, biodiversity conservation, and traditional healthcare systems. Among these species, *Tacca leontopetaloides* is an important tropical herb distributed throughout Southeast Asia, the Pacific Islands, and parts of Africa. Despite its broad geographical distribution and diverse traditional applications, it remains poorly represented in scientific literature and conservation programs. The underground tubers of *T. leontopetaloides* (Figure 1) have historically served as an emergency food source after appropriate processing to remove naturally occurring toxic compounds. Indigenous communities have developed sophisticated methods for converting the tubers into starch and flour used in preparing porridge, cakes, noodles, puddings, and other traditional foods. Such practices highlight the species' significance in enhancing food security during periods of drought, famine, and crop failure (Wardah and Ariani, 2020; Yonata et al., 2024). Similarly, ethnobotanical studies among the Bajo tribe of Indonesia have documented its cultural importance, where traditional knowledge related to harvesting and processing has been transmitted through generations (Lambra et al., 2026). In several African countries, the plant is recognized as a valuable famine food while its tubers and leaves are utilized in traditional medicine for treating gastrointestinal disorders and wound healing (Bondé et al., 2026). Recent phytochemical investigations have revealed remarkable chemical diversity within the genus *Tacca*, including steroidal saponins, flavonoids, phenolic compounds, glycosides, terpenoids, and the unique taccalonolides that possess significant anticancer activity (Jiang et al., 2014). Experimental studies have further demonstrated antimicrobial, antioxidant, antifungal, antiparasitic, and antitumor properties of different plant parts, indicating promising pharmaceutical applications (Khang et al., 2025; Agbo et al., 2025). Ecologically, *T. leontopetaloides* is adapted to tropical deciduous forests, particularly sal forests, where its underground tuber enables survival during prolonged dry seasons. It contributes to understory vegetation diversity and plays an important ecological role in maintaining forest-floor biodiversity. Despite these multiple benefits, habitat degradation, limited awareness, and inadequate scientific documentation continue to threaten its conservation and utilization. Therefore, a comprehensive synthesis of available information is essential to promote research, conservation, and sustainable utilization of this valuable but underutilized medicinal species.

Methodology

The present review was prepared through a comprehensive survey of published scientific literature, including peer-reviewed journal articles, ethnobotanical studies, pharmacological reports, and review papers cited in the reference list (Sahu et al., 2026). Information regarding taxonomy, morphology, habitat, ethnomedicinal uses, phytochemistry, pharmacological properties, and ecological significance was critically compiled, compared, and synthesized to provide an updated overview of the species. In addition to literature review, field surveys were conducted in tropical deciduous forest habitats of Odisha, India during 2025-2026 and natural populations of *T. leontopetaloides* were observed during the flowering season. Original photographs documenting the flowering plant, natural habitat, tuber

morphology and scape characteristics were collected using a digital camera to support botanical identification and ecological observations. These field photographs complement the literature-based review and enhance understanding of the species in its natural environment.



Figure 1: *T. leontopetaloides* in its habitat



Figure 2: Flower of *T. leontopetaloides*



Figure 3: Globose tuber and straited scape of *T. leontopetaloides*

Results and discussion

The present review demonstrates that *Tacca leontopetaloides* (Figure 1-3) possesses considerable medicinal, nutritional, and ecological importance despite remaining one of the least explored tropical medicinal plants.

Morphology: It is a large herb with globose tuber up to 30 cm in diameter. The leaves are long petioled, circular in outline and 3-partite, 30-90 cm in diameter with segments variously and unequally pinnate. Scape is terete, hollow, straited and longer than the petioles. Flowers is 10-40, pedicelled, bracts are 4-12, oblong-lanceolate, unequal, acuminate, greenish and sometimes striped with purple and sometimes with two-lobed tip. Perianth fleshy, subglobose, greenish and lobes margin with purple (Figure 2).

Habitat: It is occasionally found on the forest floor of tropical deciduous forests, particularly in Sal forests. It grows in semi-shaded to moderately open understory habitats where the soil is well-drained, sandy to loamy and enriched with leaf litter. Its underground tuber enables it to withstand seasonal drought, allowing the plant to persist through the dry season and produce new shoots with the onset of the monsoon.

Ethnobotany: It is a neglected but significant nutraceutical plant species widely utilized by indigenous and coastal communities across Southeast Asia, the Pacific Islands and Africa. The underground tubers (Figure 3) are traditionally harvested, grated, repeatedly washed, and processed into starch or flour to remove naturally occurring bitter and toxic compounds before being used to prepare porridge, cakes, biscuits, noodles, puddings and other traditional foods, thereby serving as an important alternative staple during periods of food scarcity (Wardah and Ariani, 2020; Yonata et al., 2024). Among the Bajo tribe of Indonesia, the species, locally known as *teo* sweet potato, that plays a vital role in household food and cultural heritage, with traditional knowledge encompassing tuber collection, processing, and preparation methods passed down through generations (Lambers et al., 2026). In Burkina Faso and several African countries, local communities collect the wild tubers from savanna and woodland habitats as a seasonal food resource and recognize the plant as an important famine food that enhances resilience during drought and crop failure. The leaves are used for wrapping food and the tubers in traditional medicine to manage gastrointestinal disorders, wounds and other common ailments (Bondé et al., 2026).

Pharmacological uses: The genus *Tacca* is a rich source of structurally diverse bioactive compounds, particularly taccalonolides, which exhibit remarkable cytotoxic, antitumour, anti-inflammatory and antimicrobial activities. These highly oxygenated steroidal compounds stabilize microtubules through a mechanism distinct from other microtubule-targeting agents and have demonstrated promising anticancer potential in experimental studies (Jiang et al., 2014). In *Tacca leontopetaloides*, leaf extracts possess significant antibacterial and antifungal activities against a range of microbial pathogens and have been successfully applied as a natural preservative to reduce spoilage and extend the shelf life of fresh mangoes (Khang et al., 2025). Phytochemical screening of the leaf extracts revealed the presence

of alkaloids, flavonoids, tannins, saponins, terpenoids, phenolic compounds and glycosides, with their abundance varying according to the extraction solvent. These metabolites contribute to the plant's antimicrobial, antioxidant and preservative properties (Khang et al., 2025). Studies on the genus have further reported the occurrence of steroidal saponins, steroidal glycosides, withanolide-type steroids, diarylheptanoids, triterpenoids and polysaccharides, the remarkable chemical diversity of *Tacca* species (Jiang et al., 2014). Moreover, tuber extracts of *T. leontopetaloides* have exhibited significant antitrypanosomal and antileishmanial activities, which demonstrates their potential as a source of antiparasitic agents (Agbo et al., 2025). Ethnopharmacological investigations further recognize the species as a valuable bioresource with promising applications in traditional medicine, natural product research and future drug discovery (Mosissa, 2020).

Future Aspects: Although *Tacca leontopetaloides* has attracted increasing scientific interest, several research gaps remain.

1. Comprehensive phytochemical profiling using advanced analytical techniques is required to identify novel bioactive constituents.
2. Clinical validation of traditional medicinal claims should be undertaken through pharmacological and toxicological studies.
3. Sustainable cultivation and domestication protocols need to be developed for large-scale production.
4. Conservation strategies should focus on protecting natural populations and documenting indigenous knowledge before it is lost.
5. Nutritional evaluation and value-added food product development could promote the species as an alternative climate-resilient crop.
6. Genomic and molecular studies may facilitate breeding programs aimed at improving medicinal and nutritional characteristics.
7. Investigation of its ecological role in tropical forest ecosystems will improve understanding of biodiversity conservation and ecosystem functioning.

Conclusion

Tacca leontopetaloides represents a highly valuable yet underutilized tropical medicinal and nutraceutical species possessing significant ethnobotanical, ecological, nutritional, and pharmacological importance. Traditional knowledge accumulated by indigenous communities demonstrates its long-standing role as both a food source and medicinal plant, while modern scientific studies increasingly validate its antimicrobial, antioxidant, antiparasitic, and anticancer properties. Its remarkable ecological adaptability, particularly its drought tolerance through underground tubers, further emphasizes its importance under changing climatic conditions. Nevertheless, limited scientific documentation, habitat degradation, and inadequate conservation efforts continue to restrict its wider utilization. Future multidisciplinary research integrating ethnobotany, phytochemistry, pharmacology, conservation biology and sustainable cultivation will be essential for realizing the full potential of this

neglected plant and promoting its contribution to biodiversity conservation, food security, and novel drug discovery.

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