

# *Tradescantia spathacea* Sw.: A Review of its Pharmacological and Ethnopharmacological Properties

<sup>1</sup>Twinkal Prajapati, <sup>2</sup>Anjali Shukla, <sup>3</sup>Nainesh Modi\*

<sup>1</sup> Student, <sup>2</sup>Research Scholar, <sup>3</sup> Associate Professor

<sup>1,2,3</sup>Department of Botany, Bioinformatics and Climate Change Impacts Management, Gujarat University, Navrangpura, Ahmedabad- 380009, Gujarat, India.

Email – <sup>1</sup>twinkalprajapati103@gmail.com, <sup>2</sup>anjalishukla.3675@gmail.com, <sup>3</sup>nrmodi@gujaratuniversity.ac.in

**Abstract:** *Tradescantia spathacea*, commonly called boat-lily, is a small herb well known for its medicinal properties and widely used worldwide. *T. spathacea* is a perennial herb used globally as ethnopharmacology to assist problems like, colds, sore throat, whooping cough nose-bleed, anti-fertility agent, fever, bronchitis, tuberculosis, diarrhoea, hypoglycaemic, snakebites and kidney diseases. The extracts and the compounds isolated from *T. spathacea* shows a wide spectrum of pharmacological activities including anti-cancer, anti-tuberculosis, antiviral, antioxidant and anti-inflammatory properties. This study includes work from 1982 to 2018. It summarizes information concerning ethnopharmacology, biological activities, clinical applications and toxicological reports of *T. spathacea*. This review aims at gathering the research work undertaken till date on this plant in order to provide sufficient baseline information for the lack of medico-clinical validation and future works.

**Key Words:** Ethnopharmacology, Pharmacological, *Tradescantia spathacea*.

## 1. INTRODUCTION:

*T. Spathacea* or boat-lily of the genus *Tradescantia* belongs to the Commelinaceae family. It occurs naturally in the West Indies, Mexico, and Central America, where it usually grows in forests and urban areas. It's an herb native to Mexico with fleshy rhizomes. It has rosettes of waxy lance-shaped leaves. Leaves are dark to metallic green above, with glossy purple underneath.<sup>[1]</sup> In China, flowers of this species are used in herbal treatments to cure dysentery, as well as cosmetic treatments in the Yucatan, Guatemala, and Belize. The plant has been extensively distributed to tropical and sub-tropical regions, steadily developed and has turn out to be an invasive plant.<sup>[2]</sup>

In the traditional medicine plant of *T. Spathacea* were used for the treatment of mycosal infections, venereal diseases, urinary tract infections, hemorrhoids, tuberculosis and cough. Other traditional uses of anti-inflammatory, anti-toxic supplement and improve blood circulation, anti-diarrheal, expectorant, hypoglycaemic agent and against snakebites were also reported. Pharmacological activities of different extracts of various *Tradescantia* species had been experimentally proved antibacterial, anti-hyperuricemia, analgesic and anti-inflammatory effects. The cytotoxic and hepatoprotective activities of *T. spathacea* were reported.<sup>[3]</sup>

Table 1 Classification of *Tradescantiaspathacea*

Domain	Eukaryota
Phylum	Spermatophyta
Subphylum	Angiospermae
Class	Monocotyledonae
Order	Commelinales
Family	Commelinaceae
Genus	<i>Tradescantia</i>
Species	<i>Tradescantiaspathacea</i>

## 2. Morphology:

*T. spathacea* or Moses-in-the-Cradle is an herb native to Mexico with fleshy rhizomes. It has rosettes of waxy lance-shaped leaves, which are dark to metallic green, with glossy purple underneath. These reach up to 1 foot (30 cm) long by 3 inches (7.5 cm) wide. They are very attractive foliage plants that reach 1 foot (30 cm) tall.<sup>[1]</sup> The inflorescence

is (3-6) in axillary boat-shaped involucre; the flower is actinomorphic and trimerous. The calyx appears to be polysepalous and valvate, while petals are polypetalous and valvate. Stamen is (6) and free; stigma is numerous and hairy; ovary is superiorly situated.<sup>[4]</sup>

### 3. Toxicity:

It causes rheumatism<sup>[5]</sup>Slightly toxic for both humans and animals and can cause itching and reddening of the skin. If ingested, it causes irritation to the mouth and causes abdominal pains, even being poisonous in large enough quantities.<sup>[6]</sup>

### 3. Ornamental and Invasive Significance:

The primary use of *T. spathacea* is, as ornamentals and houseplants in tropical and temperate regions where this plant has been extensively commercialized for many years. It is considered as an invasive species in various places; on the Pacific islands, it is threatening ecosystems, and regular monitoring is recommended wherever it is present. <sup>[6]</sup>

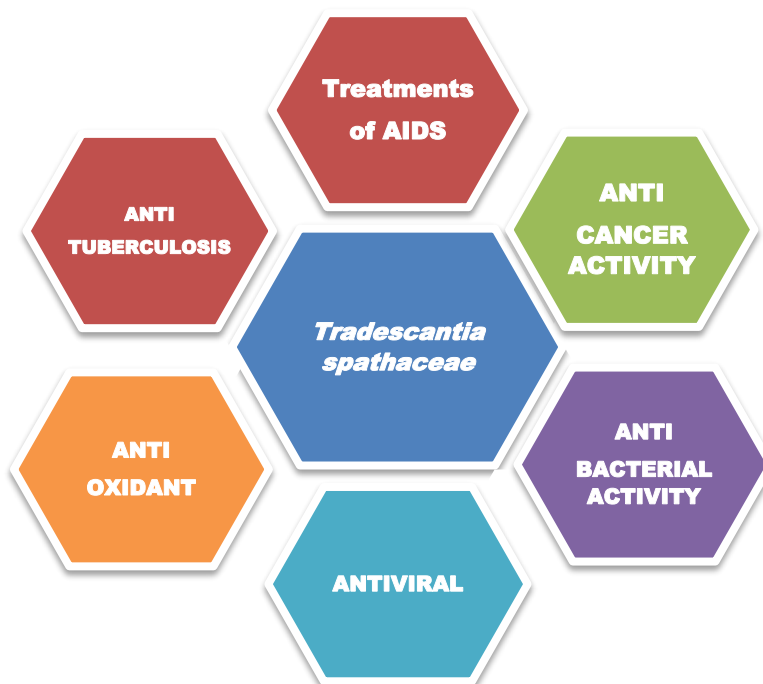


Figure 1 Pharmacological activity *Tradescantia spathaceae*

### 4. Pharmacological activity of *T. spathacea* :

The plant's popularity has been greatly enhanced with its medicinal properties in order to cure several major diseases listed in (figure 1). Also, *T. spathacea* is commonly used in different areas, and is known as multi-purpose plant (figure 2).

#### A. Treatment of AIDS:

Baez and Jose worked on *T.spathacea*, which requires medication pharmaceutical formulations to treat Acquired Immune Deficiency Syndrome (AIDS), as well as the method of acquiring it. Treatment required the combination of multipleantiretroviral drugs to avoid immunological depression and stop the replication of viruses. Antiretroviral treatment complex and costly because it requires multipledally administration of at least three drugs (triple therapy) and large doses that do not show the desired effects interfere with other drugs that should be taken with or without meals. Nevertheless, it is understood that all *Tradescantia* species are widely toxic, and it is not possible to explicitly introduce them in humans without producing a fairly violent and toxic reaction. Since the early 1990s, this plant has undergone many studies and it has been possible to say that this plant contains certain substances such as flavonics and coumaric substances with anti-inflammatory properties.<sup>[7]</sup>

#### B. Anti-cancer Activity:

*T.spathacea* medicinal plant's anti-cancer or cytotoxic properties demonstrated cell lineage in human breast adenocarcinoma. Anticancer activity treatment of *T. spathacea* in the MCF-7 cell line was measured at 229.7 $\mu$ g/ml as 50 percent MCF-7 cell line inhibition, or at 229.7 as final CTC50. Furthermore, overexpression and mutation in a number of cancers caused by  $\beta$ -catenin. Overexpression of  $\beta$ -catenin has been observed in breast cancer. The cytotoxic

activity of the *T. spathacea*, in increasing concentration.  $\beta$ -catenin expression in the human breast adenocarcinoma cell line also shows *T. spathacea* medicinal as vine.  $\beta$ catenin deregulation of signalling majorly regulated breast cancer in a female. Medicinal plant extract of the *T. spathacea* leaves is inhibited by the expression of  $\beta$ -catenin protein. Also, this plant drug was inhibited or prevented by the  $\beta$ -catenin Overexpression demonstrated by increasing concentration. Finally, expression CTC50 is 229.7 and  $\beta$ -catenin blocked by *T.spathacea* leaf extracts.<sup>[1]</sup>

#### C. Lymphocyte Proliferative Activity:

The dried extracts yield obtained from *Gynura procumbens* Lour. and *T. spathacea* were respectively 4.19 and 3.42 percent w/w. *Houttuynia cordata* fresh aerial portion (580 grams) was mixed with water and its filtrate was lyophilized to produce residue (produce: 2.91, percent w/w). Attempts were made to verify 8 forms of Thai medicinal plants that stimulate human lymphocyte development in vitro. Several lines of evidence have suggested non-specific immunostimulating or immunomodulating behaviours in laboratory animals involving a large number of medicinal plants. For initial evaluation of this activity certain in vivo studies are cumbersome. In this study it is shown that the extracts of *Gynostemma pentaphyllum*, *Houttuynia cordata* and *Phytolacca american* possess immune-stimulating behaviours utilizing human lymphocytes. The increase in activation of lymphocyte stimulation, as quantified by the activation index, was also observed in cultures that produce *T. spathacea* extracts. Important dose dependent alteration caused by certain extracts. This may be probable because of difference in the chemical constituents that are responsible for plant activities.<sup>[8]</sup>

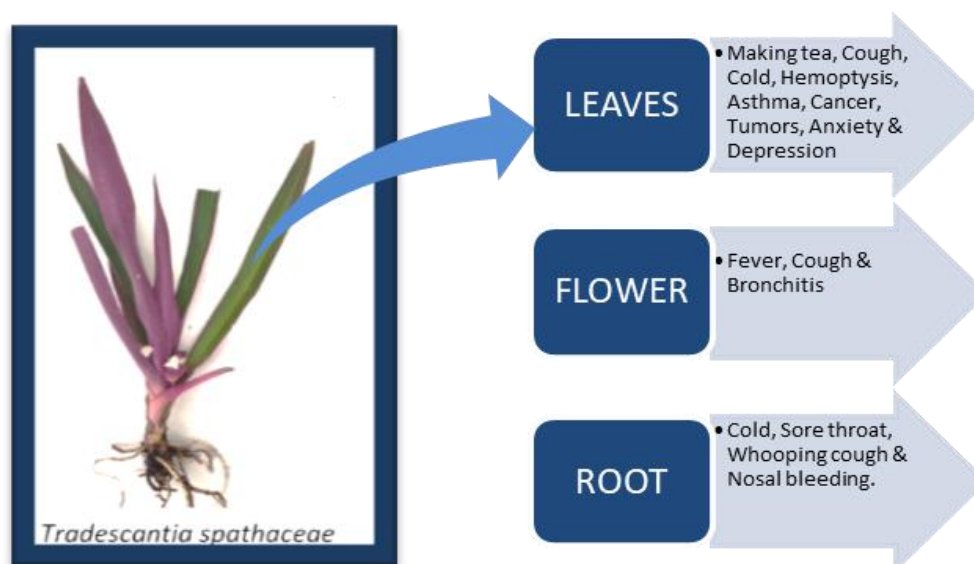


Figure 2 Pharmacological significance of *Tradescantia spathacea* as a whole plant

#### D. Anti-Tuberculosis Activity:

Radji in 2015 studied the aqueous extracts of *T. spathacea* leaves, obtained by maceration. The dried extracts are used for the Standard strain of *Mycobacterium tuberculosis* H37Rv and isolated multidrug-resistant (MDR) strain. The quantity of 2.5 g of dried extract was dissolved in Dimethyl sulfoxide. The proportion of inhibition in aqueous extract against *Mycobacterium tuberculosis* H37Rv strain was 100%, 82.1%, 78.5%, 100%, and 100% respectively, whereas against MDR strain while 93.7%, 50.0%, 50.0%, 100%, and 100% respectively. An aqueous extract of leaves exhibited potent anti-mycobacterial activity. The proportion of inhibition of aqueous extract (2.5 mg/ml) was *T. spathacea* 100% against *M. tuberculosis* H37Rv and MDR strain.<sup>[9]</sup>

#### E. Anti-Bacterial activity:

World Health Organization (WHO) described this plant as a plant with one or more organs that contain substances that can be used for therapeutic purposes or which are precursors for the synthesis of useful drugs. *T. Spathacea* Sw. member of the Commelinaceae family. It is commonly grown in gardens and is generally referred to as *Tradescantia*. The extract was tested on the following three Gram-positive bacteria: *Staphylococcus aureus*, *Staphylococcus citrus*, *Bacillus subtilis*. Five Gram-negative bacteria were also tested, including *Salmonellatyphi*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Serratia sp.* and *Proteus vulgaris*, were also examined. *Rhoeo discolors* has shown maximum antibacterial activity present test, and so this plant can be used to discover bioactive natural products that may serve as leads for the development of new pharmaceuticals that address either unmet therapeutic needs.<sup>[10]</sup>

#### F. Antiviral Activity:

Chanin 2016, a study of the *T. spathacea*, Malaysian medicinal plant for anti-chikungunya virus activity, ethanol, methanol, and chloroforms leaf extracts of *T. Spathacea* found that the most substantial cytopathic inhibitory effect was seen on Vero cells, with cell viability of 92.6%, 91.5% and 88.8%, respectively. As a broad polarity range of solvents were used in the extraction, hexane and chloroform extracts can be grouped as nonpolar extracts, ethyl acetate extract as an intermediate polar extract, and ethanol, methanol and water extract as polar extracts. Nonpolar and intermediate polar extracts were generally more toxic to the Vero cells for the cytotoxicity test than polar extracts, which impeded evaluation of their possible antiviral effects at higher concentrations. Non-toxic concentrations (cell viability approximately 90%) of an extract were then screened for cytopathic effect inhibitory effects.<sup>[11]</sup>

#### G. Antioxidant and Anti-inflammatory Activity:

Russo investigated antioxidant and anti-inflammatory activity for the root and leaves of ethanol/ hexane extracts in 2017. The antioxidant activity was measured by three specific assays: ferric reducing antioxidant power assay (FRAP), DPPH, free radical scavenging (FRS) method *in vitro* antioxidant activity and is expressed as ascorbic acid (AA) antioxidant ability equivalent (mg AA/100g). The total phenolic content (TPC) was calculated using the Folin-Ciocalteu reagent and expressed as mg/g gallic acid equivalents (GAE). 2mL of methanolic extract solutions are combined mixed with 2.5mL of 7.5% sodium bicarbonate (NaHCO<sub>3</sub>), and 2.5 mL of 10% Folin-Ciocalteu reagent. The test tubes were put in an incubator shaker for 45 min at 45°C before the absorbance quantities were taken at 765 nm with a spectrophotometer. The total phenolic content assay (TPC) showed that the roots and leaves of ethanolic/hexane solvent mixtures show very high values expressed in mg of gallic acid equivalent per gram of vegetal material <sup>[12]</sup>

### 5. Ethnopharmacological uses of *T. spathacea* :

Plant parts of *T. spathacea* are used for medicinal and ethnopharmacological purposes for the prevention of live diseases. A systematic research on the application of ethnopharmacological to *T. spathacea*, target diseases, plant of the part and the local name used are indicated in (Table No.2).

Table 2: Ethnopharmacological uses of *Tradescantia spathacea*

Local name	Region	Plant part use	Disease	Reference No.
Oyster plant	Miami Garden	Leaves	Colds, Sore throat, Whooping cough and Nosebleed.	[12]
<i>Rhoeo spathacea</i>	Haiti	Leaves	Anti-fertility agents	[13]
Sthol -shapla	Kushtia, Khulna district, Bangladesh	Leaves	Blood in the urine of women	[5]
Oyster plant	Perak	Leaves	Fever, cough, bronchitis	[11]
Daun-kepah	Chalna area, Khulna district, Bangladesh.	Whole plant	Insecticide.	[14]
<i>Rhoeo discolor</i>	Myanmar	Leaves	Tuberculosis	[15]
Sanguinaria	Guatemala, Central America	Leaves	Diarrhea	[16]
Barco de Moises	Guatemala, Central America	Leaves	Hypoglycemic	[16]
Barco de Moises	Guatemala, Central America	Leaves	Snakebites	[16]
Cordovan	Cuba	Aerial part	Kidney diseases	[17]

### 6. Conclusion:

Studies on pharmacognostical, and ethnopharmacological of *Tradescantia spathacea* by various researches discloses that it is a significant medicinal herb. It is robustly considered that comprehensive information as reported in this review on the phytochemical and ethnopharmacological properties of the plant might be a detailed evidence to support application of this plant in varied diseases. Application of this effective plant as authenticated drug demands advances clinical research. *Tradescantia spathacea*'s medicinal characteristics, as well as the economic importance make it highly significant.

**Conflict of Interest:** The authors declare that they have no competing interest.

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