



Tinospora Cardifolia and its Medicinal Uses

Ms. Ankita Anil Mahajan¹, Ms. Namrata Subhash Patil², Mr. Tushar Nana Patil³, Mr. Prathamesh Kalu Patil⁴, Mr. Momin Sanaurrehman⁵, Mr. Mohammad Awais⁶, Dr. Swapnil Dilip Deo⁷.

^{1,2,3,4} Student, Dr. Uttamrao Mahajan College of B. Pharmacy, India.

^{5,6,7} Guide, Dr. Uttamrao Mahajan College of B. Pharmacy, India.

ABSTRACT:

Medicinal plants have been used by humans for their medicinal values since the beginning of human civilization. Nature has been producing medicines for thousands of years, and many modern medicines are isolated from natural sources. Resourced communities in India's primary healthcare system.

Tinospora cordifolia is a plant widely used in folk and Ayurvedic medicine throughout India. Although almost all of its components are used in medicine, its leaves, stems and roots are the most important medicines. Tinospora cordifolia is a versatile crop suitable for all lifestyles. It belongs to the Fangji family. It has many different effects on the body. [1] It is considered an important herb in the Indian System of Medicine (ISM) and is used to treat fever, urinary problems, stomach diseases, skin diseases, leprosy, diabetes and many other ailments, pain. The plant is reported to contain alkaloids, terpenoids, lignans, steroids and other substances that determine the phytochemical and pharmacological activity of Tinospora cordifolia. [2] There are many valuable medicines. Immunomodulation or anti-inflammatory, anti-tumor, cognitive, anti-inflammatory, anti-tumor, anti-hyperglycemia, anti-hyperlipidemia. [3]

Keywords: Medicinal plant, Tinospora cordifolia, immunomodulator Natural khoom, biodiversity.

Introduction:

Red and fleshy, have many small drupes on thick stalks, have scars near the terminal and are red in color. Tinospora cordifolia is known by The World Health Organization reports that 80% of the world's population relies on traditional medicine that uses plant extracts or active ingredients. India's rich biodiversity and rich knowledge of modern systems of medicine (Ayurveda, Siddha, Unani, Amchi and indigenous health) have created a strong foundation for the use of herbs that are excellent in treating and reducing many diseases.

Tinospora cordifolia is one of the harmless and widely used herbs in Ayurvedic medicine. It belongs to the Fangji family. It is a hairless, fleshy, woody climbing tree that grows in India. It is also found in Myanmar and Sri Lanka. It grows well in warm, perennial regions, often reaching a good height and climbing the trunks of large trees. The body is gray or milky white, deeply spiral-shaped and split longitudinally, with large rosette-shaped lentils in the cavities.

The wood is white, soft and porous, and the freshly cut area quickly turns yellow when exposed to the elements. The leaves are simple, alternate, without stipules, with long petioles, cordateshaped, and show multilayered reticular veining. Long, linear aerial roots grow from the branches. The flowers are small and unisexual. Male flowers are found in clusters, and female flowers are found singly. Six sepals are arranged in two whorls of three. The leaves are six in number, arranged in two rings, obovate and membranous. The collected fruits are different names in different languages of India such as Tippateega (Telugu), Shindilakodi (Tamil), Amruthu, Chittamruthu (Malayalam), Amrutha balli (Kannada), Rasakinda (Sinhala), gurcha (Hindi). , , garo (Gujarati), Amritavalli (Sanskrit), Guduchi (Marathi), Guluchi (Oli Asia) [4]

T. cordifolia (synonym: Tinospora sinensis (Lour.) Merr.), also known as Guduchi/Amrita and Latin name: Tinospora cordifolia (Wild) Hook. F. & Thomson, English: Gulamcha Green Bovine Bile/Indian Green Bovine Bile, Hindi: Giloya. It belongs to the Fangjiaceae family and is found in Myanmar, Sri Lanka and China. [5]

Growth Requirement:

The plant is very hardy and can grow in almost any climate, but prefers warmer climates. Planting is usually done during the rainy season (July-August). Since it is a climbing plant, it needs support to grow. Fast-growing plants such as neem (Azadirachta indica), jatropha (Jatropica curcas) and moringa (Moringa oleifera) are planted to promote their growth. Tinospora cordifolia grown with neem (Azadirachta indica) is called NEEM GILOY and its chemical composition is similar to Azadirachta indica and Azadirachta indica with better medicinal properties

T. Heartwort prefers medium black or red soil for cultivation. Giloy can also grow well in different soil types, from sandy to clay loam. However, the soil must be well-drained, sufficiently moist and rich in organic matter to support its development.

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Growth Constraints: -

T. cordifolia can be propagated by seeds and vegetative cuttings. However, both methods are not suitable for mass production and have problems with traditional cultivation methods. Seed viability is very low, and seed quality and germination are the main problems in vegetative propagation. The plant is also not suitable for cutting as its productivity is lower and its growth depends on weather conditions. Considering the growth limitations, plant tissue culture technology will be a suitable method for growth in a short time and place. [7]

Botanical Description: The trunk structure is fibrous and pale yellow woody in cross section with radially arranged wedged-shaped bundles of trees with large channels separated by narrow medullary rays. Its bark is dark and spiral in color, varying from milky white to grey, and there are rosette-shaped lentils on the stems. The leaves are membranous panicles, arising from small leaves, irregular, small, yellow. Male flowers are in clusters, and female flowers are usually single. The seed is curved. The fruit is heart-shaped. The flowers are axillary, 2-9 cm long, fleshy and has a single seed. Blooms in summer and bears fruit in winter.[8]

Taxonomical Description : *Tinospora cordifolia* plant belongs to the Ranunculales order and the Apophyllaceae class. This species is common in India, extending from the Himalayas to the south of the Indian subcontinent. It is also found in neighboring countries such as Bangladesh, Pakistan and Sri Lanka. Southeast Asian countries such as Malaysia, Indonesia and Thailand introduced this plant.[9]

Pharmacognosy of *Tinospora Cardifolia*:

1. body - fleshy
2. stem - long thread, as above, growing from branches.
3. Bark – thin, gray or creamy white, fleshy stems exposed when peeled.
4. Leaves - heart-shaped (heart-shaped), membranous, fleshy.
5. Flowers - Blooms in summer
 - a) Male flowers - small, yellow or green, appear in clusters.
 - b) Female flowers - appear solitary.
6. Fruits - pistachio, fleshy, shiny, red when ripe. Occurs in winter
7. Seeds - curved, large beans.
8. Material: stems, roots
9. Distribution: The plant is found in tropical regions of India from Kumaon to Assam and Myanmar, Bihar, Konkan to Sri Lanka. It is a large climbing tree that grows on the tallest trees of the forest, reaching 10 meters in length but giving roots no thicker than wire.
10. Cultivation: Soil and Climate: It grows well in almost all types of soil and in every climate.
11. Planting seedlings: Cut stems are used for planting between May and June. It needs some support, preferably a neem tree and a mango tree, such plants should be more productive.
12. Weeding and Hoeing: Regular hoeing of nurseries and fields when necessary
13. Irrigation: Fields should be irrigated regularly if necessary.[10]



Fig. no.1 *Tinospora cordifolia*(Guduchi)

Scientific Classification:

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Order	Ranunculales
Family	Menispermaceae
Genus	<i>Tinospora</i>
Species	<i>T. cordifolia</i>

Chemical Constituent :

A large number of chemicals have been isolated from *T. cordifolia*, belonging to different classes such as alkaloids, diterpenoidlactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides. Leaves of this plant are rich in protein (11.2%), calcium and phosphorus. [11]

Acetate esters of four new clerodane furanoditerpene glycosides (aminosides A, B, C, and D) were isolated from their stems. The structure of these compounds was determined by spectroscopic studies.[12] The glycosylation components of Cordyceps polysaccharides were isolated, purified, methylated, hydrolyzed, reduced, and acetylated. Partially methylated alditol acetate (PMAA) derivatives were thus obtained by gas chromatography mass spectrometry (GCMS) studies. The following compounds have been reported: terminal glucose, 4-xylose, 4-glucose, 4,6glucose and 2,3,4,6glucose.[13,14] Callus and cell suspension cultures are produced from plant root explants. Accumulation of berberine and jatrorrhizine (protoberberine alkaloids) was observed in callus and cell suspension cultures. [15]

Planting in the field:

Land Preparation and Fertilization:

The entire land is plowed, harrowed and weeded. During land preparation, initial dose FYM (Farm Manure) @ 10 tons/ha and half doses of nitrogen (75 kg) is used.

Transplanting and optimum spacing:

Knotted stem cuttings are planted directly in the field. In order to get better results, it is recommended that the visual distance be 3 m × 3 m. Plants need support to grow, and this support can be provided by carrying stakes or trellises.

Intercropping system:

As a large vine plant, it requires a host that will soon envelop and cover the host. If you throw away trunk cuttings from trees that have aerial roots, they will begin to grow and take root in the soil.

Interculture and maintenance practices:

It is recommended to subsequently apply 10 tonnes of FYM containing 75 kg of nitrogen (20% nitrogen content). For good growth of the vine, it is necessary to hoe about 2 to 3 times as much as the plants. The space between plant rows should be cleared and hoed frequently to keep it clear of weeds, especially in the early stage of development as weeds will be suppressed by weeds.

Irrigation practices:

Crops are grown in rain-fed conditions. However, occasional irrigation during cold and hot weather may result in reduced survival of crops.[16]

Medicinal Properties Of *Tinospora Cardifolia***Immunomodulatory Activity:**

Tinospora cordifolia is known for its anti-inflammatory properties. The active ingredients 11-Hydroxymusculone, N-methyl-2-pyrrolidone, Nformylannonain, cordifolioside A, magnoline, tinocordicide and syringin have been reported to have immunomodulatory and cytotoxicity functions.[17]

From which the ethanol extract (100 mg/kg/oral) originates changes the concentration of antioxidant enzymes, increases T cells and B. cells by blocking the reaction for immunomodulatory activity< It plays an important role in the immune system, It increases the melatonin concentration in the pineal gland, Increases IL2, IL10 and TNF α Levels. Other cytokines play an important role in the immune system.[18]Green ox bile juice extract has been reported to affect cytokine production, mitosis, stimulation and activation of immune cells[19].

Tinospora cordifolia extract to further phagocytose *Candida* cells on in vitro slides PMN cells can be developed Phagocytosis method [20].

Oral administration of cordiole extract(100 mg/kg, orally) showed an increase in footpad thickness,white blood cell count and bone marrow cellshas a stimulating effect on the hematopoietic system, which indicates that shows: a good immunomodulatory effect[21]. A study by Bharti Umretia et al showed that the classical preparation of Guduchi Ghana (an important form of aqueous extract of Guduchi) showed a significant effect on the immune system. A competitive, controlled, balanced clinical study demonstrated the effect of *Tinospora* lotion on interleukin 1, interleukin 6, and interleukin 8 determined using serum sample.

It prevents hyperkeratosis and infiltration of inflammatory cells into scabies.

Modulation of Interleukin Levels with Green Ox Bile Lotion Increases Anti-Scabies Activity.[22]

Antiaging Activity:

Tinospora cordifolia. The aqueous extract of the root contains alkaloids (berberine, palatine, mandolin, violation, isoclavine), glycoside steroids, phenolic compounds, polysaccharides. The leaves of this plant rich in calcium and phosphorus. It has been shown to have a strong free radical scavenging power against reactive oxygen and nitrogen species, thereby reducing the expression of the iNOS gene (high levels creating the opportunity to react with superoxide, causing cytotoxicity). An increase in glutathione catalase and superoxide dismutase (antioxidant) was observed, as well as a decrease in thiobarbituric acid-reactive species. It has been shown to increase the activity of monoamine oxidase (MAO-A and MAO-B) and increase the level of monoamine in the brain, which has a significant impact on work.[23]

Radiation Therapy:

A study published in the journal Evidence-Based Complementary and Alternative Medicine proves that Giloy may help prevent side effects of radiation therapy. These experiments were done on aged male mice and focused on the damage that radiation therapy had on the male mice's testicles. Male rats treated with Giloy and exposed to radiation had fewer tumors and other side effects than male rats not given Giloy. These studies show that Giroir may be effective in preventing infertility and related problems in men receiving radiation therapy.[24]

Anti Allergic Activity:

The antiallergic effects of *Tinospora cordifolia* have been studied. The results showed that compared to placebo, heart leaves could reduce sneezing, runny nose, nasal congestion, and nasal irritation, and improved nasal congestion and nasal mucosa. [25]

Formulation of *Tinospora cordifolia* (Guduchi Satva)**Requirements:-**

Chemicals- Giloy (5kg), Distilled Water.

Equipments- mortar pestle, filter paper, beaker etc.

Procedure:-

1. Remove the bark and take up to 5 kg of new giloy stems and pound (remove) them with a mortar and pestle.
2. Then put it in water overnight (12 hours)
3. The mass is fixed and left for 1 hour and passed through Mesh 150 to remove any sap impurities or small sap. After passing through Mesh 150, the supernatant was collected and allowed to stand for. Approximately 5-6 hours.
4. Filter the supernatant with filter paper and carefully collect the remaining white starch on the filter paper.
5. This white starch is then left to dry under the sun in the laboratory
6. With this method, 2.24 grams of powder is obtained from 5 kg of giloy stalk.
7. The amount of starch varies according to the quality of the product stems. Since thick stems have more starch, thin and newly developed stems have less extraction.

Evaluation Parameters:

a) Angle of repose :- Maximum angle between the pile and the horizontal plane. Calculate from the formula: $\tan\theta = h/r = 0.6/2.75 = 0.2181$ $\tan\theta = 0.2181$
 $\theta = \tan^{-1}(0.2) = 12$,

b) Bulk density: It is the ratio of the mass of the mixture to the bulk volume. Pour the powder into the measuring cylinder and measure the volume of the powder. Building volume = 3.5 Stack density = mass / stack volume = $1.203/3.5 = 0.34$

c) Impact rate: It is the ratio of the mass of the mixture to the vibration volume. It is determined by measuring the volume of the powder after 100 samples using a digital density meter. Vibration volume = 3 Impact intensity = mass / impact volume = $1.203/3 = 0.40$

d) Carr Performance index: measured according to the following formula % compression value = stage speed-batch speed / stage density $\times 100 = 0.40 - 0.34 / 0.40 \times 100 = 15\%$

e) Hauser ratio (HR): measured according to the following formula H.R = tap speed / bulk density = $0.40/0.34 = 1.17$

Role:

Giloi stems may help improve digestion and reduce constipation, acidity, gas and bloating. It is useful for people with weak digestive systems. It can also improve the body's insulin response, thus reducing the incidence of diabetes. In addition, the shrunken handle can also reduce mental stress and improve memory.

- Diabetes According to experts, Giloy can be used as a hypoglycaemic drug to help treat type
- 2 diabetes Giloi Juice gives good results for people with diabetes. Arthritis Giloi juice has anti-inflammatory and anti-arthritis properties that can help treat the symptoms of arthritis. Take giloy powder boiled in milk to cure arthritis.
- Improves Vision in many parts of India, giloy powder is mixed with water and applied to the eyes, as it is believed that it can help improve eyesight.

Future Scope:

Tino gallbladder is available in powder, tablet, juice, and supplement form and can be taken in any of these forms. Tinospora cordifolia may be used as an important source of phytochemicals for the pharmaceutical industry in the future. This plant has wonderful healing properties but is overused due to human activities. Therefore, pay attention to protection. Plant tissue culture technology offers fast-growing plants another way to preserve and enhance secondary crops.

Traditions of plant collecting and botanical medicine have been passed down from generation to generation. The medicinal effects of plants obtained from different sources are very different. India's domestic pharmaceutical industry has grown in recent years. Therefore, the demand for medicinal plants has increased significantly. According to latest estimates, there are around 8,000 pharmacies licensed under the Indian Medical System in the country, and all of them produce medicines to meet the needs of the public. The pharmacy's annual total raw materials are measured in tons. Currently, increasing demand is being met by illegal logging and/or paid removal of trees / branches / leaves from habitats, or felling of trees in situ and/or removal of trees (there is value met)/bud / leaves. Human activities have overexploited this plant species with its healing potential. Therefore, pay attention to protection. Plant culture methods provide another means for rapid propagation, preservation and promotion of secondary products from these plants. Fungal endophytes are a group of organisms that live in tissues and are often asymptomatic. These organisms live in the tissues of plants and have relationships with them that range from symbiotic to somewhat problematic.

As heterotrophs and symbionts, they can live in many places due to their diverse diet. The use of endophytes together with other organisms for the synthesis of various metabolites (primary and secondary) is now at the forefront of biotechnology. T. cordifolia has been shown to be associated with endophytic bacteria. The metabolic and biochemical diversity of these organisms in nature is one of the main determinants of their biological success.

This allows other organisms to adapt and benefit from different environments. Endophytic fungi produce many compounds used in modern medicine, agriculture and industry. Therefore, further research is needed to improve efficiency in the field of tissue culture, to conduct molecular analysis of all genetic changes that occur for the wrong reason and to investigate various fungal endophytes to represent the sky. The right synthesis method and nanobiotechnology will solve the problems of many incurable diseases with medicine.[26]

Conclusion:

Guduchi Satva contains more or less starch and small amounts of plant alkaloids. The powder obtained from Giloi has many properties such as antibacterial, anti-diabetic and anti-inflammatory properties. The information obtained from the preparation of powders and granules can be used as a model for testing the preparation of Giloy powders and granules and for future use by pharmaceutical companies.

Although *Tinospora cordifolia* has been used successfully in Ayurvedic medicine for centuries, research and development on *Tinospora cordifolia* and its products is needed for commercial success and medical use. This analysis can be used for further research and clinical purposes.

Heartwood is a medicinal plant with many compounds. Different bioactive compounds include alkaloids, steroids, glycosides, sesquiterpenoids, etc. takes place. Current reviews focus on the antifungal activity, antioxidant activity, anti-inflammatory activity, anti-inflammatory activity, hypolipidemic effect, liver disease, drug resistance infection, anti-HIV, anti-osteoporotic ability, antiinflammatory, of ART. Treatment, preventive activity, immunomodulatory activity, body diseases and Parkinson's disease of *T. cordifolia*.

References:

1. Pandey MM, Rastogi S, Rawat AK; Indian herbal drug for general healthcare: An overview. *Internet J Altern Med*, 2008; 6:1.
2. A.S. Olabiyi, F.E. Nkemhule, O.A. Odukoya, T.A. Samuel, S.O. Ogbonnia, Inhibition of glycosylation as an index of activity in plants with antidiabetic potentials, *Biochem. Pharmacol.* 2 (2013) 181.
3. Bishayi B, Roychowdherry S, Ghosh S, Sengupta M, Hepatoprotective and immunomodulatory properties of *Tinospora cordifolia* in CCl₄ intoxicated mature albino rats. *J Toxicol Sci.*, 27 (3): 139–146, (2002)
4. LB Gaur, SP Singh, SC Gaur, SS Bornare, AS Chavan, Sudhir Kumar, Mukh Ram; A Basic Information, Cultivation and Medicinal Use of *Tinospora cordifolia*. *Pop. Kheti*, 2014; 2(3):188- 192.
5. S. Saha, S. Ghosh, *Tinospora cordifolia*: one plant, many roles, *Ancient Sci. Life* 31 (2012) 151–159.
6. Chaudhari S, Shaikh N. Gaduchi-the best ayurvedic herb. *The Pharma Innovation Journal* 2013; 2(4):97-102.
7. Raghunathan K, Sharma PV. The aqueous extract of *T. cordifolia* used reduction of blood sugar in alloxan induced hyperglycemic rats and rabbits. *J Res Ind Med* 1969; 3:203-209.
8. BV Shetty ; V Singh. *Flora of Rajasthan*. 1st edition, Merrut publishers and Distributors, Merrut. Vol 1: 756-100.
9. SS Singh ; SC Pandey ; S Srivastava ; VS Gupta ; B Patro ; AC Ghosh *Indian Journal of Pharmacology*, 2003, 35, 83-91.
10. S S Singh, S C Pandey, S Srivastava, V S Gupta, B Patro & A C Ghosh., *Indian J. Pharmacol.*, 2003; 35: 83.
11. Khosa RL, Prasad S. Pharmacognostical studies on Guduchi (*Tinospora cordifolia* Miers) *J Res Ind Med.*, 1971; 6: 261–9.
12. Maurya R, Manhas LR, Gupta P, Mishra PK, Singh G, Yadav PP. Amritosides A, B, C and D: Clerodane furano diterpene glucosides from *Tinospora cordifolia*. *Phytochemistry*, 2004; 65: 2051–5.
13. Jahfar M, Azadi P. Glycosyl composition of polysaccharide from *Tinospora cordifolia*. II: Glycosyl linkages. *Acta Pharm.*, 2004; 54: 73–8.
14. Jahfar M. Glycosyl composition of polysaccharide from *Tinospora cordifolia*. *Acta Pharm.*, 2003; 53: 65–9.
15. Chintalwar GJ, Gupta S, Roja G, Bapat VA. Protoberberine alkaloids from callus and cell suspension cultures of *Tinospora cordifolia*. *Pharmaceut Biol.*, 2003; 42: 81–6
16. [https://echarak.in/echarak/templates/Tinospora%20cordifolia%20%20\(Willd.\)%20Miers%20ex%20HK.%20f.%20%20%20Th.pdf](https://echarak.in/echarak/templates/Tinospora%20cordifolia%20%20(Willd.)%20Miers%20ex%20HK.%20f.%20%20%20Th.pdf)
17. Sharma U, Bala M, Kumar N, Singh B, Munshi RK, Bhalerao S; Immunomodulatory active compounds from *Tinospora cordifolia*. *J Ethnopharmacol*, 2012; 141(3):918-26.
18. Vaibhav Ahera and Arun Kumar Wahib; Biotechnological Approach to Evaluate the Immunomodulatory Activity of Ethanolic Extract of *Tinospora cordifolia* Stem (Mango Plant Climber). *Iranian Journal of Pharmaceutical Research*, 2012; 11 (3): 863-872.
19. Upadhyaya R, PR, Sharma V, Anita KV; Assessment of the multifaceted immunomodulatory potential of the aqueous extract of *Tinospora cordifolia*. *Res J Chem Sci.* 2011; 1:71–9.
20. Salkar K, Suthar A, Chotalia C; Study of Immunomodulatory activity of *Tinospora cordifolia* extract. *IJAPBC*, 2014; 3(4):880-883.

21. Vaibhav D. Aher, Arunkumar Wah; Pharmacological Study of *Tinospora cordifolia* As An Immunomodulator. *Int J Curr Pharm Res*, 2010; 2(4): 5254.
22. . Umretia B, Vaishnav P, Patgiri B, Shukla V; Immunomodulatory activity of Guduchi Ghana (Aqueous Extract of *Tinospora cordifolia* Miers). *NJIRM*, 2013; 4(3): 90-96.
23. D N K Sarma, R L Khosa, J P N Chansauria, M Sahai. Antiulcer activity of *Tinospora cordifolia* Miers and *Centella asiatica* linn extracts, *Phytotherapy Research*, 1995; 9(8): 589–590.
24. Sangeetha MK, Balaji HR, Gayathri V, Vasanthi HR. *Tinospora cordifolia* attenuates oxidative stress and distorted carbohydrate metabolism in experimentally induced type 2 diabetes in rats. *J Nat Med.*, 2011; 65: 544
25. Bhawya D, Anilakumar K R. In-vitro Antioxidant Potency of *Tinospora cordifolia* (gulancha) in Sequential Extracts, *International Journal of Pharmaceutical & Biological Archives*, 2010; 1(5): 448-456
26. <https://www.ayurvedinfo.com/>