

## Tinosporacordifolia

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**ABSTRACT:** Natural products with medicinal value are gradually gaining importance in clinical research due to their well-known property of no side effects as compared to drugs. *Tinosporacordifolia* commonly named as “Guduchi” is known for its immense application in the treatment of various diseases in the traditional ayurvedic literature. Recently the discovery of active components from the plant and their biological function in disease control has led to active interest in the plant across the globe.

### I. INTRODUCTION

*Tinosporacordifolia* commonly named as

“Guduchi” in Sanskrit belonging to family Menispermaceae is a

Genetically diverse, large, deciduous climbing shrub with greenish

Yellow typical flowers, found at higher altitude. In racemes or

Racemose panicles, the male flowers are clustered and female are

Solitary. The flowering season expands over summers and winters.

A variety of active components derived from the plant like alkaloids,

Steroids, diterpenoid lactones, aliphatics, and glycosides have been

Isolated from the different parts of the plant body, including root,

Stem, and whole plant. Recently, the plant is of great interest to

Researchers across the globe because of its reported medicinal

Properties like anti-diabetic, anti-periodic, anti-spasmodic, anti-

Inflammatory, anti-arthritic, anti-oxidant, anti-allergic, anti-stress,

Anti-leprotic, anti-malarial, hepatoprotective, immunomodulatory

And anti-neoplastic activities. In this review, we focus our attention

To (i) the reported genetic diversity in the Plant

(ii) biological roles reported in humans and animals and active

components from Plant.

(iii) biological roles reported in humans and animals. It is a large,

Deciduous, extensively-spreading, climbing shrub with several

Elongated twining branches. Leaves are simple, alternate, and

Exstipulate with long petioles up to 15 cm (6 in) long which are

Roundish and pulvinate, both at the base and apex with the basal one

[3].A camless engine proof-of-concept prototype longer and twisted partially and half way around. It gets its

name heart-leaved moonseed by its heart-shaped leaves and its reddish fruit.

Lamina are broadly ovate or ovate cordate, 10–20 cm (4–8 in) long

or 8–15 cm (3–6 in) broad, seven nerved and deeply cordate at base,

membranous, pubescent above, whitish tomentose with a prominent

reticulum beneath. Flowers are unisexual, small on separate plants

and appearing when the plant is leafless, greenish-yellow on axillary

and terminal racemes. Male flowers are clustered, but female flowers

are usually solitary. It has six sepals in two series of three each. The

outer ones are smaller than the inner. It has six petals which are

smaller than sepals, obovate, and membranous. Fruits aggregate in

clusters of one to three. They are avoid smooth drupelets on thick

stalks with sub terminal style scars, scarlet or orange colored .



## Botanical and phramacognostical descriptions

### 1. Botanical description

It is a large, deciduous extensively spreading climbing shrub elongated twining branches. Leaves simple, alternate, exstipulate, long petioles up to 15cm long, roundish, pulvinate, both at the base and apex with the basal one longer and twisted partially and half way around. Lamina broadly ovate or ovate cordate, 10-20 cm long or 8-15 cm broad, 7 nerved and deeply cordate at base, membranous, pubescent above, whitish tomentose with a prominent re-ticulum beneath. Flowers unisexual, small on separate plants and appearing when plant is leafless, greenish yellow on axillary and terminal racemes. Male flowers clustered, female usually solitary. Sepals 6, free in two series of three each, the outer ones are smaller than the inner. Petals 6 free smaller than sepals, obovate and membranous. Fruits aggregate of 1-3, ovoid smooth drupelets on thick stalk with sub terminal style scars, scarlet or orange coloured. Distribution The plant is distributed throughout the tropical region of India up to 1,200 m above sea level from Kumaon to Assam, in north extending through West Bengal, Bihar, Deccan, Konkan, Karnataka and Kerala. It is a fairly common plant of deciduous and dry forests, growing over hedges and small trees.

### 2. Phramacognostical Description

The drug Guduchi or Amrita consists of dried pieces of mature stem of *Tinosporacordifolia*. Roots and leaves are also medicinal. The diagnostic phrama-cognostical characteristics of medicinal parts are as follows: Stem Stem is characterized by the presence of bicollateral vascular bundles sur-rounded by pericycle fibres. The cork arises in the sub-epidermal layers and give rise to 2-3 layers of cork. Starch is

present throughout the parenchyma of the stem<sup>5, 6</sup>. Root The aerial

root is characterized by tetra to penta-arch primary structure. The cortex is divided into outer thick walled zone representing the velamen and inner parenchymatous zone containing secretory canals.

Starch is present throughout the parenchyma of the aerial root. The starch grains are oval or elliptical in shape, mostly simple but some times as compound grains of 2 to 5 components, with faintly marked concentric striation and central hilum appearing like a point<sup>5, 6</sup>. Leaf

The petiole in transverse section is more or less circular in outline. No trich-omes were found. The cross section shows a single layered epidermis and a wide zone of cortex composed of 3 to 4 layers of endodermis. The vascular bundles consist of radial rows of xylem on the inner side and a few rows of cambium cells on the outer side followed by phloem. The mid-rib is more or less circular in outline and palisade do not extend over the stellar tissue. The cross section of lamina shows a dorsiventral structure with its mesophyll differentiated into palisade and spongy tissue. The meso-phyll is clearly differentiated into a palisade layer made up

Of one row of thin columnar cells which occupy a little more than half

Of the width of mesophyll. Glandular hairs are present in lower

Surface only. They are unicellular and somewhat club shaped. The

Base is surrounded by 4 to 5 epidermal cells. Starch is present

Throughout the tissue<sup>7</sup>. Substitutes and adulterants *T. Cordifolia* is

Substituted or adulterated with other species of *Tinospora*, viz. *T.*

Sinensis (Lour.) Merrill Although, the microscopical characters of T.

Sinensis resemble that of T. Cordifolia, there are few characters by

Which these two species can be differentiated. The distinguishing

Characters are: In T. Cordifolia the sclerenchymatous sheath becomes

Disintegrated into scattered irregular patches in the cortical regions

Whereas in T. Sinensis it is broken into areas capping the vascular

Bundle and remains persistent even after further secondary growth.

Crystals are absent in T. Cordifolia while in T. Sinensis a large crystal

Of calcium oxalate is present within the lumen of each cork cell.

Mucilaginous cells are more in T. Cordifolia as compared to T.

Sinensis. Vascular strands are fewer in T. Cordifolia while greater in T.

Sinensis. Xylem is well developed in each strip of vascular strand in

T. cordifolia while it is poorly developed in T. Sinensis. Pith is very

Narrow and composed of thin walled cells in T. Cordifolia while it is

Wide in T. Sinensis. Starch content is more in T. Cordifolia as

Compared to T. Sinensis.



### 3. Standards for identity and purity Quantitative Standards

The following standards for identity and purity are reported Foreign

Matter not more than 2.0%; Total ash not more than 7.0%; Acid-

Soluble ash not less than 0.8%; Ethanol-soluble extractive not less than

6.0%; Loss on drying not more than 7.5%; Lead not more than 10 ppm;

Arsenic not more than 2 ppm; Heavy metals not more than 20 ppm;

Total bacterial count not more than 3000 CFU/gm; Yeasts and moulds

Not more than 100 CFU/gm; Bitters content on dry basis by Gravimetry

/HPTLC not less than 3% w/w. TLC pattern On TLC identity test the

Drug showed 6 major molecules having Rf value and colour 0.24

(yellow); 0.35 (dark green) (tinosporoside); 0.42 (green); 0.44 (light

Yellow); 0.76 (dark green) and 0.79 (dark green) using chloroform and

Methanol (9:1) as a solvent system and anisaldehyde sulphuric acid as

Spraying reagent

#### 4. Phytochemicals

Tinospora contains diverse phytochemicals, including alkaloids,

Phytosterols, glycosides, and mixed other chemical compounds.[1] Cne,

Tinosporaside, jatrorrhizine, palmatine, berberine,[5] tembeterine,

Tinocordifolioside, phenylpropene disaccharides, choline, tinospora acid,

Tinospora, tinosporin, and tinosporide have been isolated from Tinospora

Cordifolia The plant T. Cordifolia has been subjected to chemical

Investigations exten-

Sively and a number of chemical constituents belonging to the different groups, viz. terpenoids, alkaloids, lignans, steroids have been reported.

#### A. Terpenoids

Tinosporide, Furanolactone, diterpene, furanoid, diterpene, Tinosporaside, ecdysterone, makisterone, and several glucosides isolated as poly acetate phenylpropene disaccharides, cordifolioside A, B and C, cordifolioside D and E, Tinocordioside, cordioside, palmatosides C and F, Sesquiterpene glucoside, tinocordifolioside, Sesquiterpenetinocordifolin

#### B. Alkaloids

Tinosporine, Magnoflorine, Tembetarine, Berberine, Choline, Palmatine, Jatrorrhizine, 1,2-Substituted pyrrolidine, Alkaloids, viz. jatrorrhizine, palmatine, berberine, tembeterine, choline

#### C. Steroids

Giloinsterol,  $\beta$ -Sitosterol,  $\alpha$ -Hydroxy ecdysone,

#### D. Others

Giloinin, Tinosporan acetate, Tinosporic acid, Tinosporal acetate, Tinosporidine, Heptacosanol, Cordifolone, Octacosanol, Tinosponone, Tinosporic acid, tinosporal, tinosporon, 20-hydroxyecdysone, two phytoecdysones, an immunologically active arabinogalactan.

#### Benefits of giloy

##### 1. Metabolic benefits

Giloy might be helpful for those with diabetes or who are at risk of heart

Disease. Several studies done on animals and on cells in the lab show that

Giloy reduces blood sugar by making cells less insulin resistant. It also may

Reduce cholesterol levels in lab animals.

However, it's important to note that the animal study used a multi-herb

Formula that included seven other herbs in addition to giloy. Because of

This, it's unclear whether the potential benefits came from giloy or another

Herb. One of the alkaloid compounds in giloy is berberine. It's a traditional

Herbal remedy that human studies have shown reduces blood sugar.

Berberine works in a similar way to the diabetes medication metformin.

Berberine may be as effective as some medications at helping reduce not

Only blood sugar but also LDL (bad) cholesterol and blood pressure.

Berberine and other alkaloids in giloy might account for some of the results

Seen in lab tests



## 2. Immune system benefits

Lab studies on giloy show that it has antioxidant effects, which means that

It can help protect cells from oxidative damage .  
When tested on breast,

Prostate, and ovarian cancer cells in the lab, certain compounds from giloy

Show anticancer potential . Taking giloy might help boost your immune

System against allergies, too. A study including 75 people with hay

Fever allergies found that giloy helped alleviate their symptoms, including

Runny and stuffy nose . Notably, 83% of people said they experienced

Complete relief from sneezing after taking giloy .  
Certain compounds in

Giloy can also stimulate your immune system and protect you from bacteria

And other pathogens. It's able to prevent the growth of Klebsiella

Pneumoniae, E. Coli, Pseudomonas spp., and Proteus spp. .

It seems to kill larger pathogens, too. One study compared a T.

Cordifolia lotion with permethrin, a medication to treat

Scabies, which is an itchy rash caused by tiny mites that infest your skin.

The study found that both treatments worked equally well to kill the scabies

And clear the rash .

## 3. Hepatic disorders:

In clinical studies 20 patients of infectious hepatitis were selected on the

Basis of clinical and biochemical findings. Four tablets (500mg each) thrice

In a day, orally with fresh water were given to the patient for 4 weeks.

Comparison between before and after treatment of those patients were

Showed that drug T. Cordifolia (Guduchi) played an important role in

Relieving the symptoms as well as normalization of altered liver function

Test.

## 4. Post menopausal syndrome:

Clinical evaluation of a non-hormonal drug minofil containing T. Cordifolia

Along with other plant drugs was done in women of post-menopausal

Syndrome. Breast discomfort, nausea and fluid retention was observed in

With estriol and almost no side effect was observed with minofil. Minofil

With short period of therapy and more sustained effect and without side

Effects is cost effective and may be an alternative to HRT, which is still in

Controversy. However, long term follow up is required before universal use

In post-menopausal syndrome.

## Cultivation & Management of crop Cultivation Technology

The T. Cordifolia plants grow in the tropical and subtropical climate. The

Plants grow well in Light-medium sandy loam soil rich in organic matter

And with adequate drainage, are suitable for its cultivation . It does not

Tolerate high rainfall or waterlogged conditions. The land is ploughed,

Harrowed, and made weed-free. A basal dose of FYM (farmyard manure)

10 tonnes per hectare and half dose of nitrogen (75 kg) are applied at the

Time of land preparation. *T. Cordifolia* can be propagated by seeds and also

Vegetative cuttings. Stem cuttings are the best planting material for raising a

Commercial crop. The cuttings can be obtained from mother plants in May–

June. The cuttings of the small finger thickness with 6 to 8-inch length long

Stem having 2 or 3 nodes are used. The healthy plants stem cuttings are

Sown directly in the ready field. Promotion of rooting of shoot cuttings by

Exogenous auxins application in several species has been reported . The

Nursery method for plants cutting planted in the poly bags of 4-inch ×6-

Inch size during Feb-March. The poly bags filled with mud, sand and dry

Cow dung or vermicompost in the ratio 1:1:1. The rooting of the cuttings

Takes almost 15 to 25 days. The cuttings of *T. Cordifolia* will be ready for

Planting into the main field by this time in the month of May-June. About

2500 cuttings are required for plantation in one hectare of land. Optimum

Spacing of 3 m × 3 m is recommended for better yield.

The plant requires support to grow, which can be provided by raising

Wooden stakes or trellis. Already growing shrubs or trees can also support

The plants. It's good some support preferably trees like Neem and Mango

Trees. Such plants are supposed to possess better medicinal values. The crop

Is grown under rain-fed conditions. However, occasional irrigation during

Extremes of cold and hot weather may help the crop survive adverse

Conditions. The stem is harvested during autumn when it develops to a

Diameter of more than 2.5 cm. Basal part is left for further growth. The

Stem should be cut into small pieces and dried in the shade. It can be stored

In gunny bags and kept in cool and airy storage godowns. Stem bark peels

Off even by touch. Thus, stem should be cut very cautiously as peeled stem

Decays very soon. On an average farmer are getting an average yield of 8-

10 q./ha and the rate for a kg. Of dried stem ranges from Rs. 25-

35. Conclusion: *T. Cordifolia* has high medicinal value in the world and is

Also the number one recommended natural herb for the Indian system of

Medicine . In fact, in Egyptians, Chinese, Indian, Greek, Roman and

Hebrew have given the high status of importance to this medicinal property.

There is a needed to develop more agriculture technologies for the *T.*

*Cordifolia*, by which farmers can earn more profit by cultivating the *T.*

Cordifolia as medicinal crop in the future into small pieces and dried in

Shad.

### **Therapeutic Applications Pre-Clinical Studies (Animal Model):**

During last two decades, T. Cordifolia has demonstrated various pre-

Clinical activities in animal models/in vitro testings. Some of such notable

Findings are re-ported here:

#### **I. Anti-cancer/anti-tumour activity:**

Exposure of hela cells to 0, 5, 10, 25, 50 and 100 g/ml of extracts

Methanol, aqueous and methylene chloride resulted in a dose-dependent but

Significant in-crease in cell killing, when compared to non-drug-treated

Controls. The results demonstrate that Guduchi killed the cells very

Effectively in vitro and deserves attention as an antineoplastic agent.

Administration of T. Cordifolia stem methanolic extract to balb/c mice (200

Mg/kg, i.p. daily for 5 days) increased the total white blood cell count

Significantly ( $P < 0.001$ ). It also increased bone marrow cellularity

( $18.16 \times 10^6$ /femur) and  $\alpha$ -esterase positive cells (1423/4000 cells) in bone

Marrow indicating increased maturation of stem cells. Administration of the

Extract was also found to significantly increase humoral immune re-

Sponse, as seen from the increase in plaque-forming cells in the spleen

(1575 PFC/106 spleen cells) and circulating antibody titre, and to produce

An en-hancement (129%) in macrophage activation. Tinospora extract

Reduced solid tumour growth and synergistically acted with

Cyclophosphamide in reducing (83%) the animal tumours.

#### **II. Anti Diabetic and Hyperglycaemic activity:**

Alcoholic extracts of the stem showed activity against E.coli. The acute and

Chronic effect of oral feeding of the plant extracts affect rabbit and albino

Rats. Effect on fasting blood sugar, glucose tolerance and against equieprine

Induced hyperglycemia have been studied. The aqueous and alcoholic

Extract caused reduction in the fasting blood sugar, which have been

Interpreted as indicating some indirect action of the drug on carbohydrate

Metabolism. Similarly, glucose tolerance had increased in the beginning but

The deterioration in tolerance occurred after one month. It has been

Suggested that the action of the drug is due to its favourable effects on the

Endogenous insulin secretion, glucose uptake inhibition of peripheral

Glucose release.

#### **III. Anti-inflammatory activity:**

The decoction of T. Cordifolia showed anti inflammatory activity on

Carrageenan induced hind paw oedema in The effect of extract of stem of T.



Cordifolia was studied on the contractile response due to various agonists

On smooth muscles of rat in the dose of 100 to 600 µg/mg. The possible

Mechanism of antagonistic action of T. Cordifolia has been discussed in the

Light of involvement of various autocooids in the pathophysiology of clinical

Joint in-flammation. The mechanism of potentiating effects of T. Cordifolia

On NA induced responses is suggested to be due to an uptake blocking

Effect of T. Cordifolia or to an inhibition of metabolism by COMT since

MAO inhibition would also produce potentiation of 5-HT responses.

## II. CONCLUSION:

The therapeutic efficacy of *Tinosporacordifolia* extensively used in Indian

System of Medicine has been established through modern testing and

Evaluation (pre-clinical and clinical trials) in different disease conditions.

These studies place this indigenous drug a novel candidate for

Bioprospection and drug development for the treatment of such diseases as

Cancer, liver disorders, ulcers, diabetes, heart diseases and postmenopausal

Syndrome, etc. Where satisfactory cure managements are still not available.

## REFERENCES

- [1]. Ashish Kumar and Jnanesha. A.C., 2017. Cultivation, Utilization and Role of
- [2]. Medicinal Plants in Tradition Medicine in Deccan Eco-climate. Int. J. On Agric. Sci., 8 (1): 98-103.
- [3]. Hartmann H.T, Kester D.E, Davies F.T and Geneve RL. 1997. Plant propagation Principles and practices. 6<sup>th</sup>edn. Prentice-Hall of India Pvt. Ltd., New Delhi. Pp.276-238.

- [4]. Singh J, Sinha K, Sharma A, Mishra N.P and Khanuja S.P., 2003. Traditional uses of *Tinosporacordifolia* (Guduchi) J. Med Aromat plant Sci; 25: 748-51
- [5]. The ayurvedic pharmacopeia of indiagovt of indiaministry of health and family Welfare department of indian system medicine of homeopathy;newdelhivol -I
- [6]. [https://en.wikipedia.org/wiki/Tinospora\\_cordifolia](https://en.wikipedia.org/wiki/Tinospora_cordifolia)
- [7]. Panditneeshee;guduchi; the amrit ofAyurveda<https://ayurvedacollege.com/articles/students/guduchi: Priyavratsharma> classical use of medicinal plant, reprint
- [8]. <https://indiabiodiversity.org/species/show/231352>
- [9]. <https://www.healthline.com/nutrition/giloy-benefits>
- [10]. Jagetia GC, Rao SK. Evaluation of the antineoplastic activity of guduchi (*Tinospora Cordifolia*) in ehrlich ascites carcinoma bearing mice. Biol Pharm Bull. 2006;29:460-6.
- [11]. Patel MB, Mishra S. Hypoglycemic activity of alkaloidal fraction of *Tinospora Cordifolia*. Phytomedicine. 2011;18:1045–52.
- [12]. Kapil A, Sharma S. Immunopotentiating compounds from *Tinosporacordifolia*. J Ethnopharmacol. 1997;58:89–95
- [13]. waminathan K, Sinha UC, Bhatt RK, Sabata BK, Tavale SS. Structure of tinosporide, A diterpenoidfuranolactone from *Tinosporacordifolia*Miers. ActaCrystallogr C. 1989;45:134–6.
- [14]. Ghosh AK, Martyr CD, Steffey M, Wang YF, Agniswamy J, Amano M, et al. Design Of substituted bis-Tetrahydrofuran (bis-THF)-derived potent HIV-1 protease Inhibitors, protein-ligand X-ray structure, and convenient syntheses of bis-THF and Substituted bis-THF Ligands. ACS Med Chem Lett. 2011;2:298–302.
- [15]. Sengupta S, Mukherjee A, Goswami R, Basu S. Hypoglycemic activity of the Antioxidant saponarin, characterized as alpha-glucosidase inhibitor present In *Tinosporacordifolia*. J Enzyme Inhib Med Chem. 2009;24:684–90