

**CURRENT STRATEGIC APPROACHES IN ETHNOMEDICINAL PLANTS OF
TINOSPORA CORDIFOLIA AND *GLORIOSA SUPERBA* – A REVIEW.****S. VEERAIHAH AND K. JAGANMOHAN REDDY***

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ABSTRACT

Tinospora cordifolia (Guduchi) is an important drug of Ayurvedic system of medicine. It is widely grown at Western ghats. It is used in diseases like jaundice, edema, gout, diabetes, swine flu (H₁N₁), hepatitis, hyper acidity, dyspepsia, fever, urinary and skin diseases. This plant contains Shikmic acid, which is isolated from plant parts and Tamiflu tablets are prepared at industrial level. Today lot of work is undertaken on it in Pharma, Biochemical, Tissue culture and Genetic engineering. *Gloriosa superba* L. is an important medicinal plant of Asia and Africa. It is a source of colchicines and colchicocides. It is used in diseases like gout, cancer, leprosy, swelling, piles, chronic ulcers and act as antipyretic, antidote in snake bite, anti helminthic, purgative and anti abortive. Due to excessive use of the plants for diverse medicinal purposes the species is on the verge of extinction and included in Red Data Book. The strenuous efforts of botanists, biotechnologists and conservationists are required to conserve these plants; otherwise we will be losing it by 2020. The present review is focused on current status of those Ethnomedicinal values, source of alkaloids, poisonous nature, conservation and future perspectives of *T. cordifolia* and *G. superba*.

KEYWORDS

Tinospora cordifolia (Guduchi), diabetes, ethnomedicine, *tinoporosides*; *Gloriosa superba* L, colchicine, conservation, biotechnology.

INTRODUCTION

Tinospora cardifolia (Willd.) Miers ex Hook.f. and Thoms. (Family: Menispermaceae) commonly known, as Guduchi or Tippatega is an important drug of Indian Systems of Medicine (ISM). It is a large, glabrous, deciduous climbing shrub. It is a Hindu mythological term that refers to the heavenly elixir that has saved celestial beings from old age and kept them eternally young. The drug is well known as Indian bitter and prescribed in fevers, diabetes, dyspepsia, jaundice, urinary problems, skin diseases, chronic diarrhoea and dysentery. It has been also indicated to be useful in the treatment of heart diseases, leprosy, helmenthiasis and rheumatoid arthritis. The starch obtained from the stem is known as “Guduchi – satva” which is highly nutritive and digestive and is used in many diseases.

Gloriosa superba L. (Colchicaceae) also known as Malabar glory lily or Visha nabi (Telugu) is a perennial tuberous climbing herb scattered in tropical and sub-tropical regions of the India. It is commonly grown in Asia and African countries. In India, it occurs commonly in tropical forests of Bengal and Karnataka (Shivakumar and Krishnamurthy, 2002). The ethnobotanists are trying to ascertain new medicines from the forests with the help of tribal people. *G. superba* is also known as the national flower of Zimbabwe. *G. superba* is a semi – woody herbaceous branched climber, one to four stems arise from a single V-shaped fleshy cylindrical tuber. *G. superba* is an imperative medicinal plant; all parts are used in the medicine, which contains two important alkaloids, colchicine and colchicoside. Colchicine is occasionally used in cytological and plant breeding research. Medicinally, the tuber is used as abortifacient. Paste of the tuber is externally applied for parasitic skin diseases (Ghani 1998, 2000). It is commonly

grown from seeds and tubers. The species also contains another toxic alkaloid, gloriosine (Gooneratne 1966, Angunawela and Fernando 1971.) The genus Gloriosa is comprised about 10 to 15 known species.

1. *Gloriosa superba* Linn.
2. *G. luteo*
3. *G. plantii*
4. *G. latifolia*
5. *G. magnifica*
6. *G. rothschildiana*
7. *G. abysstinica*
8. *G. longifolia*
9. *G. simplex*
10. *G. grandiflora*
11. *G. lipolidii*
12. *G. virenses*
13. *G. sudanica*

Gloriosa is monobasic with a genetic base X=11. The important species found in India are *G. superba* and *G. rothschildiane*.

Botanical Description:

Tinospora grows as climber; leaves are simple, alternate and long petiole, lamina broadly ovate, 7 nerved and deeply cordate at base, flowers – unisexual, male flowers clustered, female usually solitary, sepals 6 free, two series. Petals 6 free smaller than sepals, aggregate fruits, flowers can be seen in June, while fruits occur in November. *G. superba* L is also a climber, leaves are simple, ovate tips spirally twisted, flowers – large, solitary, 6 petals, seeds are numerous in capsule, leaf apex gives tendrils.

Chemical Constituents:

In *Tinospora cordifolia* tinosporone, tinosporic acid, (+) – diterpene, cordifolisides A to E, syringen, berberine, giloin, gilenin, crude giloininand, arabinogalactan polysaccharide, picrotene, bergenin, gilosterol, tinosporal, tinosporidine,, sitosterol, cordifol,

heptacosanol, octacosanol, tinosporide, columbin, chasmanthin, palmarin, palmatosides C and F, amritosides, cordioside, ecdysterone, makisterone A, magnoflorine, tembertarine, glucan polysaccharide, syringine apisyglycoside, isocolumbin, palmatine, tetra hydro palmatine, and jatrorrhizine are present.

In *G.superba*, L. 0.25% colchicine is present in tubers apart from containing sitosterol, glucoside, beta and gamma lumicolichines, beta sitosterol, flucoside and 2 – H – 6 – MeO benzoic acid. Flower contain luteolin and N-formylde-Me-Colchicine.

MEDICINAL IMPORTANCE OF PLANTS:

In *Tinospora cordifolia* all parts of plants are used for various medicinal purposes. The plant oil is effective in reducing pain and edema and in gout and skin diseases. The herb accords longevity, enhances memory, improves health and best owes youth, betters complexion, voice, energy and luster of the skin. It is helpful in treating digestive ailments such as hyperacidity, colitis, worm infestations, loss of appetite, abdominal pain, excessive thirst, vomiting and even liver disorders like hepatitis. Fresh juice of guduchi, when mixed with rock candy, speeds up the recovery in hepatitis patients. It helps in remedying ailments like raktapitta, anemia, cardiac debility, diabetes, sexual debility and splenic disorders. The starch of the plant serves as a household remedy for chronic fever, relieves burning sensation and increases energy and appetite. The decoction of guduchi, mixed with nimba and vasa, eases the itching and oozing. It benefits general weakness, dyspepsia, impotency, dysentery, secondary syphilis, tuberculosis, jaundice, constipation, leprosy, general debility, cutaneous rashes and condylomata. Guduchi helps in getting rid of renal calculi and reduces blood urea level. The decoction of guduchi and sunthi is a good combination for treating gout and rheumatic disorders. Guduchi juice, when taken with cow's milk or lodhra is effective in combating leucorrhoea. The juice is mixed with cumin seeds and consumed to reduce the burning sensation

caused due to pitta. The root of guduchi is a strong emetic and used for bowel obstruction.

Present days *Gloriosa superba* L. the leaf juice is used to kill-lice in hair, tubers contain the bitter principles, superbine and gloriosine, which in large doses are fatal; however, in small doses they are used as tonic, anti abortive and purgatives. The white flour prepared from the tubers is bitter in taste and used as stimulant. It is given with honey in gonorrhoea, leprosy, colic and intestinal worms and for promoting labor pains. Its warm poultice is locally applied in rheumatism, snakebites and neuralgic pains (Samy et al; 2008). The conventional method of propagation is through corms, since poor seed germination restricts their use in multiplication. Therefore, propagation by tissue culture technique is necessary (Finnie and van Staden, 1989, 1991). *G.superba* also produces another alkaloid gloriosine. Colchicines anti-mitotic property disrupts the spindle apparatus that separate chromosomes throughout metaphase. Kumar (1953) studied doubling of chromosomes induced by gloriosine isolated from *G.superba*. For commercial production of colchicine and its derivatives natural production from invitro methods of the source plants are thus of great attention. In the past two decades, focus has been on Plant Biotechnology as a potential alternative production method, using cultured cells rather than plants. *Gloriosa superba* is a good abortifacient causing expulsion of foetus from the womb. Roots are antiopercoid, purgative, cholagogue, anthelmintic. It is bitter, acrid, astringent, anthelmintic and germicidal. It cures leprosy, swelling, piles, chronic ulcers, colic pain in bladder. Tubers are tonic and anthelmintic when taken in doses of 5 to 10 grains. Paste is antidote in snake bite, powder of root is given for treatment of rheumatic fever. Various plant parts are used in spleen complaints, sores, tumours and syphilis.

Demand assessment

General details:

UNO, UNEP, IUCN suggest various countries to conserve as ex-situ and in – situ

to *T.cordifolia* & *G.superba*. Colchicine has been extracted from the corms of *Colchicum autumnale*, growing wild in some parts of Europe. Recently, the supply of colchicines and schismic acid from the conventional sources has not been sufficient to cope with its increasing demand. FDA – approved use of Colchicine is to treat gout. Among the Indian plants, the seeds of *Iphigenia stellate* contain 0.90% the corms of *Colchicum leuteum* contain 0.25% and the seeds of *Gloriosa superba* are found to contain 0.60% of colchicine. The availability from both wild and cultivated sources makes the seeds of *G. superba* a potential source of colchicine in India.

Product importance:

T.cordifolia's whole parts of plant contain schismic acid which is used to treat H₁ N₁ flu disease. Now today China earns lot of National Income from Tamiflu and Relenja tablets. These are made from leaves of *T.cordifolia*. Recently India also tries to make flu tablets from this plant. These plants are densely grown at Western ghats.

G. superba is highly valued in both traditional and modern therapies. Seed and tubers (active content colchicine) are used mainly for treating gout and rheumatism. Use of its seed, which have the same medicinal use as that of tubers, ensures that its plants are not destroyed in nature, being a non – destructive harvesting.

Pre – Clinical Studies (Animal model):

During last two decades, *T. cordifolia* has demonstrated various pre clinical activities in animal models / *in vitro* testings. They are:-

1. Anti – Cancer / anti – tumour activity
2. Anti Diabetic and Hyper glycaemic activity.
3. Anti – inflammatory activity
4. Anti – oxidant activity.
5. Anti – stress activity
6. Anti Ulcer activity
7. Digestive activity
8. Hypo lipidaemic activity.
9. Immunobiological activities.
10. Anti H₁ N₁

Source of Precious alkaloids:

G. superba produces two important alkaloid colchicine and gloriosine, which are present in seeds and tubers while the other compounds such as lumicolchicine, 3-de methyl-N-deformyl-N-de acetyl colchicine, 3-de methyl colchicine, N-formyl de acetyl colchicine have been isolated from the plant (Sugandhi, 2000, Suri, 2001). Suri *et al* (2001) reported new colchicine glycoside, 3-O-demethyl colchicine 3-O-alpha – D – glucopyranoside in *G.superba* seeds. Kaur *et al.* (2007) studied purification of 3 – monomeric monocot mannose – binding lectins and their evaluation for antipoxviral activity isolated from *G.superba*. Alkaloids are structurally heterogeneous class of secondary biomolecules derived from basically 5 amino acids. Ornithine, Lysine, Phenyl alanine, Tyrosine and Tryptophan (Thakur, 1975). Thakur *et al*(1975) reported the substances from plant of the sub family Wurmbaeoideae and their derivatives along with alkaloids from the *G.superba*.

Colchicine:

It is a conventional drug for gout obtained from corms of *G.superba* and *Colchicum autumnale* (Thakur, 1975; Sivakumar and Krishnamurthy, 2002). The terms “colchicine” is derived from area known as Colchis near Black Sea. *Colchicum autumnale* grows wild in Europe and Africa. Thomson was the first who proposed early idea of action of colchicine in gout treatment. Kanan *et al* (2007) studied optimization of solvents for efficient isolation of Colchicines from *G.superba* Ghosh *et al* (2002) studied the root culture of *G.superba* by using direct and indirect precursor of the biosynthetic pathway for the enhancement of colchicine production. Ghost *et al.* (2006) reported that colchicine can also be applied in the lanolin paste or as a solution, for instance, on a cotton dot, placed in a leaf axil. Khan *et al* (2007) evaluated the enzyme inhibition activities of *G.superba* rhizomes extract against lipoxigenase, actylcholinesterase, butyrycholinesterase and Urease in which wonderful inhibition was observed on

lipoxygenase. Further, Khan *et al* (2008) reported anti microbial potential of *G.superba* extracts in which excellent antifungal activity was confirmed against *Candida albicans*, *C.glabrate*, *Trichophyton longifusus*, *Microsporium canis* and *Staphylococcus aureus*.

Ethnomedicinal Uses:

Tinospora cordifolia decoction of stem (3ml) with common salt (2gm) is taken in

empty stomach for one month for the cure of acidity. This method is followed by tribes of Similipal Lodha, Bathudi and Saunti (Orissa State)

Gloriosa superba L. tuber paste (3gm) with paste of long peppers (*Piper longum*) (1gm) is prescribed once a day for twenty days as a cure for rheumatism. This method is followed by tribes of Similipal – Orissa i.e., Lodha, Munda, Gonda, Santal and Kondha.

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