

A REVIEW ON: PHYTOCHEMICAL AND PHARMACOLOGICAL POTENTIAL OF T. CORDIFOLIA AND SILYBUM MARIANUMRanjan Kumar Maji^{1*}, Suman Khan², Monisankar Pramanik³, Sourv Khawas⁴ and R. K. Vishwakarma⁵¹Krishna Institute of Pharmacy, Satkira, Topchanchi, Dhanbad, Jharkhand, India.^{2,3}Moyna Pharmaceutical Institute, Harkulibhanderchak, Moyna, Purba Medinipur, W. B, India.⁴Department of Pharmaceutical Sciences, Jharkhand Rai University, Jharkhand, India.⁵Department of Pharmacy, IBMER, Mangalayatan University, Aligarh, U. P, India.***Corresponding Author: Ranjan Kumar Maji**

Krishna Institute of Pharmacy, Satkira, Topchanchi, Dhanbad, Jharkhand, India.

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ABSTRACT

Tinospora cordifolia Hook, local name:Guduchi; English: Indian *Tinospora*, Hindi: Giloya, belongs to the family of Menispermaceae. This review article summarizes the chemical constituents and pharmacological properties found within the medicinal plant. A medicinal plant could be well-suited not only for the treatment of target site but also for boosting the body's immune system. As an alternate source of medication, medicinal herbs are continuously showing better compatibility with the human body with minimal side effects than other therapies. *Silybum marianum* is of Asteriaceae family and found Several phytochemical constituents with pharmacological properties of *Silybum marianum*. It is also used as a food remedy. This review article aims to present different aspects of *Silybum marianum* especially the data in recently published articles about its effects on different diseases. There are many indigenous systems popular worldwide, such as Ayurveda, Yoga, Siddha, Homeopathy, Unani, and Naturopathy, existing in India and other Asian countries, Africa, Australia and many more. Ayurveda, The Science of Life, describes various medicinal plants in the most refined literature in Sanskrit, Hindi, and regional languages. It is therefore necessary to search for alternative drugs for the treatment of various ailments to replace the currently used drugs of doubtful efficacy and safety for future.

KEYWORDS: *Tinospora cordifolia*, *Silybum marianum*, Phytochemical constituents, pharmacological activities, medicinal plants.

INTRODUCTION

Herbal formulations are medicinal preparation of one or more herbs present in specified quantities to give the benefits meant for cosmetic, diagnose and to mitigate diseases of human beings or animals.^[1] It is also known as botanical medicine or phytomedicine. Earlier in the twentieth century, herbal medicine was the prime medication system as antibiotics or analgesics were not available. Increasing use of an allopathic system of medicine due to its fast therapeutic action and herbal medicine gradually lost their popularity among the people. For example, Curcuma is used in Traditional Chinese Medicine for more than two thousand years to treat anti-inflammatory and robust antioxidant.^[2,3] About 70–80% of people are still using herbal medicine for their primary health because of the less side effect and better compatibility with the human body.^[4] Herbal medicine has gained momentum and is more effective as compared to synthetic drugs. Plants have been employed as therapeutic aids; many people across the world have relied on natural remedies for thousands of years. The most well-known herbal methods, such as Ayurveda,

Siddha, Unani, and Homeopathy, are practiced around the world, with an increased demand at present, in various medical systems, such as the Indian and Chinese medicine systems.^[1]

Tinospora cordifolia (Wild) Hook, local name: Guduchi/Amrita; English: Indian *Tinospora*, Hindi: Giloya/Gulanacha, belongs to the family of Menispermaceae and is found in Bangladesh, Myanmar, Sri Lanka, and China is a spreading and mounting shrub with a lot twisting branches. *T. cordifolia* is used in ayurveda medicinal system and has numerous therapeutic properties^[3,4] these include usage in inflammation, rheumatism, anemia, urinary disorder, skin diseases, jaundice, diabetes, allergic condition, etc.^[5,6] The root of *T. cordifolia* is a strong antiemetic and is also used in bowel obstruction. Few researchers also testified *T. cordifolia* is useful for remedy of chronic fever, increasing appetite and energy and relieving burning sensation. Guduchi is also in general used by local healers for the treatment of leprosy, helminthiasis, rheumatoid arthritis and to boost up immune system.^[7]

Silybum marianum is a medicinal plant whose therapeutic history dates back to 2000 years ago and was used as a hepatoprotective medication to treat jaundice and enlarged liver and spleen. Originally, *Silybum marianum* was a native of Asia and Southern Europe, but now it is found throughout the world.^[1] The Food & Drug Administration in Germany has proposed this medicinal plant to treat digestive disorders, intoxication, and alcoholic liver and as a complement drug to treat enlarged liver.^[2] *Silybum marianum* has been used medicinally for the treatment of liver diseases in Europe since the first century. Silymarin, the primary active ingredient in the seeds, has been extensively studied for hepatoprotective effects and several putative hepatoprotective mechanisms, including antioxidation and inhibition of lipid peroxidation^[12,13], as well as anti-inflammatory^[14] and anti-fibrotic effects^[15], have been recorded. Although silymarin is orally absorbed, it has very poor bioavailability due to its lower water solubility.^[16] Consequently, research efforts have been

aimed at developing novel drug delivery systems that can improve the performance of silymarin activity.^[17,19] *Miers ex Hook. f. & Thoms.*, a herbaceous vine of the family Menispermaceae is indigenous to the tropical areas of India, Myanmar and Sri Lanka. *T. cordifolia* has various common names such as guduchi, amrita, giloe, gado, galo, amrutha, balli etc. Plant is commonly known as giloya in hindi which is a mythological term that refers to the heavenly elixir that saved celestial beings from old age and kept them eternally young. A number of compounds viz. alkaloids, glycosides, diterpenoid lactones, sesquiterpenoids, steroids, phenolics, aliphatic compounds, polysaccharides and flavonoids has been confirmed in aqueous extract of *T. cordifolia* by phytochemical analysis. The high contents of a variety of phytoconstituents present in this plant were considered to be responsible for the biological activities like anti-inflammatory, anti-arthritic, anti-osteoporotic activity, anti-allergic, anti-hyperglycemic, anti-pyretic, antioxidant, diuretic and cardioprotective activity.



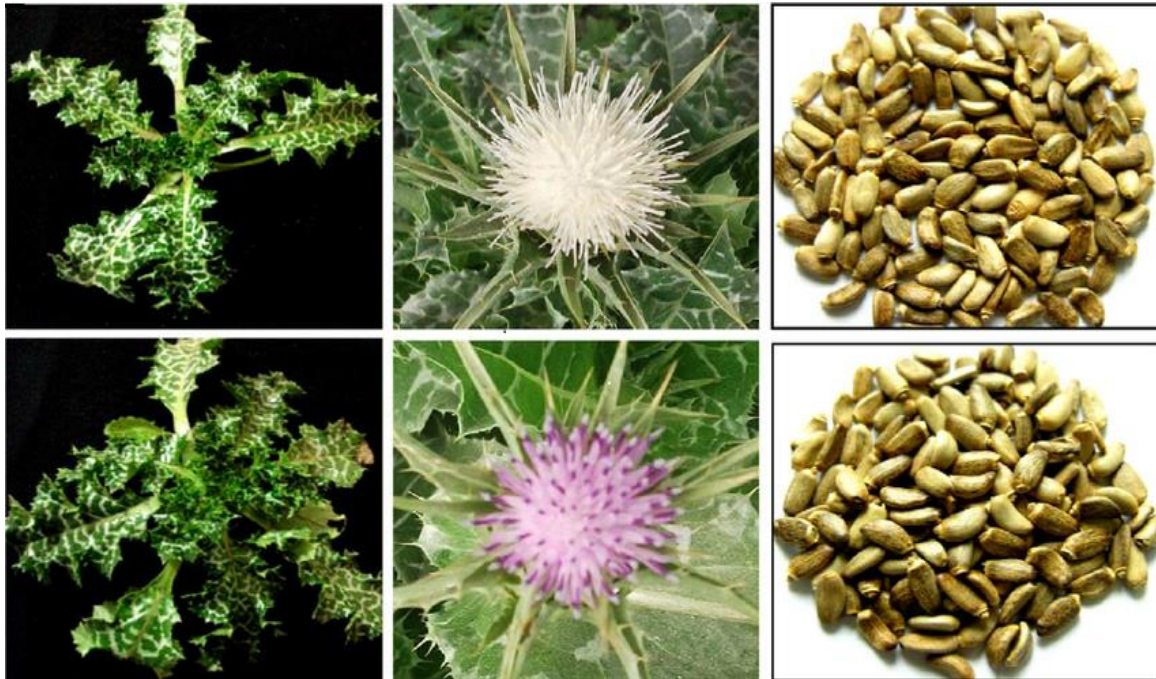
PLANTS PROFILE

CLASSIFICATION OF MEDICINAL PLANTS

1) *TINOSPORA CORDIFOLIA*

Scientific Name- <i>TinosporaCordifolia</i>
Kingdom- Plantae
Phylum- Magnoliophyta
Class— Magnoliopsida
Order— Ranunculales
Family- Menispermaceae
Genus— Tinospora
Species- T.Cordifolia

Common Name
English- Guduchi
Hindi- Giloe
Marathi- Amrutvel
Tamil- Acaci
Kannada- Amaritaballi
Telugu- Dussiramu
Sanskrit- Jivanti



2) *SILYBUM MARIANUM*

Scientific Name - <i>SilybumMarianum</i>
Kingdom -Plantae
Phylum -Magnoliophyta
Class -Magnoliopsida
Order -Asterales
Family -Asteraceae
Genus -Silybum
Species -Marianum

Common Name
English -Milk thistle
Hindi -Dogri
Marathi -Silybum
Tamil -Marianum
Kannada -suleebum
Telugu -Marian thistle
Sanskrit -Dudhpatra

MORPHOLOGICAL PROPERTIES OF *T.CORDIFOLIA*

- Look like as Climbing shrub.
- Tetra-to penta-arch structure- aerial roots.
- Root an outer cortex- thick wall and an inner parenchymatous zone.
- *Tinospora Cordifolia* Branches are long and dirty white or light greyish brown in colour.
- Bark is creamy white or grey.
- *Tinospora Cordifolia* flower has six sepals.
- Flowers-unisexual, small, and greenish yellow on auxiliary and terminal racemes.
- Ovate 10-12 cm long and 8-15 cm broad.
- *Tinospora Cordifolia* Flowers grow during the summer (March to June) while fruits develop during the winter.
- *Tinospora Cordifolia* Bark is succulent, with deep clefts spotted and large rosette-like lenticels.
- Seeds are curved in shape.
- Endocarp is well ornamented and confers vital taxonomic characters.
- The *Tinospora Cordifolia* has been divided into different parts i.e., stem, leaves, flower, and fruits.
- Shrub-coiling branches.
- Male flowers -lustered, female-solitary.
- 2-9 cm long leaflet branches and greenish-yellow in colour.

MORPHOLOGICAL PROPERTIES OF *SILYBUM MARIANUM*

- *Silybum marianum*-shiny pale green leaves
- *Silybum marianum* red to purple flowers with white veins.
- *Silybum marianum* is a biennale, glabrous, pale green, spinescent plant with straight stems.
- Leaves of this plant are big and have white spots around the veins.
- Several pinnate parts as triangular-ovary parts.
- *Silybum marianum* has simple or a little branched or relatively thick branches.
- *Silybum marianum* branches terminate to a green mass and with longitudinal rakes.
- It grows up to 200 cm in height, with the stem of cottony, having an overall conical shape.
- Its leaves are oblong to lanceolate, and the stem is usually hollow.
- *Silybum marianum* has lobate or pinnate, with spiny edges and hairless, shiny green, with milk-white veins.
- The flower heads of this plant are up to 12 cm long and wide, with red-purple color.

PHYTOCHEMICAL CONSTITUENTS OF TINOSPORA CORDIFOLIA

S.NO	PHYTOCHEMICAL	ACTIVE COMPOUNDS
1.	Glycosides	Tinocordifolioside, Tinocordiside, Cordifolioside A, B, C, D & E, Cordioside, Cordifolioside A & B, Syringin, Syringinapiosylglycoside, Palmatosides C & F
2.	Steroids	β -sitosterol, δ -sitosterol, 20 β - Hydroxy ecdysone Aerial part Ecdysterone, Makisterone A, Giloinsterol.
3.	Diterpenoid lactones	Furanolactone, Tinosporides, Tinosporon, Jateorine, Columbin, Clerodane derivatives and [(5R,10R)-4R-8R-dihydroxy-2S3R:15,16-diepoxy-cleroda-13 (16), 14-dieno-17,12S: 18,1S-dilactone].
4.	Alkaloids	Berberine, Palmatine, Tembetarine, Magnoflorine, Choline, Tinosporin, Isocolumbin, Palmatine, Tetrahydropalmatine, Magnoflorine.
5.	Sesquiterpenoid	Tinocordifolin
6.	Aliphatic compound	Octacosanol, Heptacosanol
7.	Lignans	3 (a, 4-dihydroxy-3-methoxybenzyl)-4-(4-hydroxy-3-methoxybenzyl), (S).
8.	Others	Tinosporan acetate, Giloin, Tinosporal acetate, Tinosporidine, Heptacosanol, Octacosanol, sinapic acid, Tinosponone, two phytoecdysones, an immunologically active arabinogalactan, Tinosporic acid, Cordifol, Cordifellone, Giloinin, Jatrorrhizine.

PHYTOCHEMICAL CONSTITUENTS OF SILYBUM MARIANUM

S.NO	PHYTOCHEMICAL (LEAVES,ROOTS,FRUITS,SEEDS)	ACTIVE COMPOUNDS
1.	Trimethylglycine	Kaempferol
2.	lipids	Apigenin
3.	Alkaloids	Apigenin-7-o-glucuronide
4.	Sugars	Apigenin-7-o-glucosides
5.	Betaine	4,7 diglucosides
6.	Silymarin	Vit-K
7.	Tyramine	Quercetin
8.	Essential oils	Dehydrokaempferol
9.	Saponins	3-sulphate
10.	Histamine	Taxiflin
11.	Mucilages	Luteolin
12.	Vit-C, Vit-E	Acetate triterpene, B-sitosterol, glucosides
13.	Silibin and Silydianin	Silandrine, Isosilibin
14.	Silychristine	3-deoxy-flavones, Neosilyhermin-A and Neosilyhermin-B

PHARMACOLOGICAL ACTIVITIES

TINOSPORA CORDIFOLIA	SILYBUM MARIANUM
Antioxidant activity	Antioxidant activity
Antimicrobial activities	Antimicrobial activities
Antidiabetic activity	Antiviral activity
Antistress activity	Hepatitis C and B virus
Antidiabetic activity	Chikungunya virus
Hypolipidemic effect	Dengue and mayaro virus
Anti-allergic activity	Osteoprotective activities
Asthma	SARS CoV-2 virus
Infertility	Hepatoprotective activity
Depression	Cardioprotective activity
Cardioprotective activity	Anticarcinogenic activity
Diarrhea	Neuroprotective activity
Radioprotective	Hepatic cancer
Hypolipidemic effect	breast cancer

Hepatic disorder	prostate cancer
Anticancer activities	oral cancer
Anti-osteoporotic effects	Bladder cancer
Parkinson's disease	Lungs cancer
Immunomodulating activity	Skin cancer
Neuropharmacological activities	gastric cancer
Antipyretic	
Wound healing	
Anti-HIV potential	

CONCLUSION

T. cordifolia and *silybum marianum* has been discussed in this review. Some of these include antioxidant, antimicrobial, anti-HIV, analgesic, antifungal, anticancer, hepatoprotective, antiproliferative, anti epileptic and other ailments. Its properties have been acknowledged as effective in treating various diseases. The multidirectional pharmacological approaches of the *T. cordifolia* and *silybum marianum* plants has been explored in the present review. Due to its therapeutic efficacy in boosting immunity, we believed that *T. cordifolia* and *silybum marianum* could also be effective against various diseases, although researchers scientifically and doctors medically worldwide are trying to develop an effective vaccine using herbal medicine. Also, it could be one of the herbal candidates for bioprospecting and drug development for disease treatment. The presence of chemical constituents indicates that *T. cordifolia* plant could serve as a “leader in the traditional system of medicine” for the development of novel agents against diseases in the coming years. The present review provides a diversified therapeutic approach for present or future studies to carry out research on the miracle plant so that they could get medicinally important herbal drugs and use them in the treatment of various diseases. These research advances highlight the diverse pharmacological activities of *T. cordifolia*, making it a subject of continued interest in the fields of traditional medicine and modern pharmacological study. Researchers are increasingly uncovering the mechanisms behind its therapeutic effects, which may lead to the development of novel treatments and therapies in the future prospective.

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