

# Development of Antimicrobial Finish in Textile Fabric Using TINOSPORA CORDIFOLIA

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**Abstract** — *Tinospora cordifolia*, also known as guduchi or heart-leaved moonseed, is a medicinal plant commonly used in Ayurvedic medicine. The roots, stems, and leaves of this plant are believed to have a range of medicinal properties, including antibacterial, antimicrobial, antifungal, and anti-stress effects. *Tinospora cordifolia* is used to treat a variety of health conditions, including jaundice, fever, gout, urinary and upper respiratory infections, skin infections, chronic diarrhea, dysentery, itching, and erysipelas. It is also thought to have preventive effects against these conditions. The medicinal properties of *Tinospora cordifolia*, such as its antibacterial, antimicrobial, and antifungal effects, the medicinal properties of this plant may make it useful for the development of antimicrobial textiles or other medical textiles for use in healthcare settings. May make it a useful material for the development of medical textiles that can help prevent the spread of infection or protect against other health hazards.

**Keywords:** *Tinospora Cordifolia*, Anti-Microbial, Anti-Fungal, Anti-Inflammatory, Anti-Viral.

## I. INTRODUCTION

Natural fiber like cotton, silk, wool, Linen and Jute were utilized for the maximum by humans over a maximum period. Then after a few centuries man-made fibres like nylon, polyester, polypropylene etc. These synthetic fibres made materials become part of the daily usage, because of this nearly 20% of our planet earth is affected by our clothing industry. The products made from manmade fibres are non-biodegradable and also people who are involved in the manufacturing industry of synthetic fibres are affected by skin diseases, cancer etc.

In order to overcome these situations people gradually move towards sustainable products. Sustainable products are the products which don't affect the environment, social and economy and also saves public health and wellbeing. These are the products made from natural sources like plants, by-products of natural made materials etc. Generally some plants that have existed from ancient days have enormous medicinal values which may not be noticed. As days passed, people in the 21th century started to use old age methods and products for wellbeing.

All natural plant textiles are biodegradable and sustainable In order to create new fabrics that can cure the world, a number of plants, fruits, and seeds are currently either being rediscovered or newly processed. Textiles from plants have existed worldwide for centuries. It has a long history of use in textiles, cordage, paper, and more recently in technical applications in composite materials. The use of textile fibres can be traced back to 9000 B.C. Textile products

from plants can be considered to be renewable and biodegradable as they grow and can be returned to the soil without harm and sometimes even with beneficial effects. There are many textiles products developed from plants such as hemp fibres, flax fibres, Jute fibres, cotton fibres etc.

So one such plant is called Seenthal Kodi (*Tinospora cordifolia*). It is a large, extensively spreading climbing shrub which has enormous twining branches. This plant is found in India, Myanmar and Sri Lanka. It can be found in India's tropical region up to 1,200 metres above sea level. Tropical and subtropical areas are good for its growth.

## A. TINOSPORA CORDIFOLIA

An essential medicinal plant in Ayurveda, *Tinospora cordifolia*, often known as guduchi, is an herbaceous vine that belongs to the Menispermaceae family and is used to treat a variety of illnesses. The name Guduchi is referred to as a plant which protects from diseases, in Sanskrit ancient textbooks of Ayurveda. In Ayurveda, it is designated as a Rasayana drug recommended to enhance general body resistance, promote longevity and as an antistress and adaptogen. The name "Amrita" denotes both its significance in Ayurveda and its usage for regeneration. This plant is also mentioned in important Pharmacopoeias. The species is widely distributed in India extending from the Himalaya region to the Southern part of India.

## B. Botanical Description:

*Tinospora cordifolia* is a widely spreading, dioecious perennial climber that flourishes on a variety of hedges and trees. *T. cordifolia* has succulent stems with long, fleshy aerial roots that grow from the branches. The stems are green with smooth surfaces and swelling at nodes; older stems have a light brown surface characterized with variety protuberances caused by circular lenticels. Its thickness ranges from 0.6 to 5 cm in diameter. The bark is creamy white to grey, deeply spiralled, and dotted with huge, rosette-like lenticels in the spaces between. The leaves are membranous and cordate. The Small, greenish yellow or yellow blooms are present. Female flowers often grow alone, whereas male flowers are grouped together. The seeds are curved. Fruits are fleshy and single seeded. Flowers where grow in during summer and fruits where grow in during winter.

### C. Chemical Constituent of the Plant

Type of chemical	Active compounds	Part in which Present
Alkaloids (Tikta- Bitter Principle)	Berberine, Palmatine	Stem
	Tembetarine, Magnoflorine, Chlorine, Tinosporin, Isocolumbin, Palmatine, Tetrahydropalmatine.	Root
Glycosides	18-norclerodane glucoside, Furanoid diterpene glucoside, Tinocordiside, Tinocordifolioside, Cordioside, Cordifolioside A, Cordifolioside B, Syringin, Syringin-apiosylglycoside, Palmatosides C, Palmatosides F, Cordifolioside A, Cordifolioside B, Cordifolioside C, Cordifolioside D, Cordifolioside E	Stem
Diterpenoid lactones	Furanlactone, Clerodane derivatives and [(5R,10R)-4R-8R-dihydroxy-2S-3R:15,16-diepoxy-cleroda-13 (16), 14-dieno- 17,12S:18,1S-dilactone] and Tinosporon, Tinosporides and, Jateorine, Columbine	Whole plant

## II. HERBAL CLOTHING:

*Tinospora cordifolia* (also known as Guduchi) is a well-known medicinal plant in Ayurvedic and traditional medicine systems. It is used for a variety of ailments and is considered to have a number of beneficial properties, including antioxidant, anti-inflammatory, and immunomodulatory effects. In Ayurveda, it is often used as a tonic for improving overall health and well-being, and as a treatment for various diseases and conditions.

It is important to note, however, that while traditional medicine systems have been used for centuries, the scientific evidence for their effectiveness is limited. Many traditional remedies have not been thoroughly studied using modern scientific methods, and some have been found to have limited or no efficacy. Before using any traditional remedies, it is important to consult a healthcare professional to ensure that they are safe and appropriate for the individual's health needs.

### A. Extraction Done In Various Parts

Fresh parts of *Tinospora cordifolia* Leaves, Stem and Aerial roots were collected. The materials were washed thoroughly 2 to 3 times with water and then dried under shade after complete shade drying. Then the dried material was grinded in a mixer, the powder was kept in small plastic bags with paper labelling. Assembly was arranged and thimble was prepared. 10 grams of air dried powdered drug was extracted with Hexane for about 3 days, then extract solution was collected and concentrated under vacuum using rotavapor. The plant material was then once more gathered and allowed to air dry. When fully dried, it was once more put into the thimble. The same method was repeated for chloroform, alcohol and water. Then finally the dried extracts were collected in a pre-weighed glass vial. It has been proved that,

- The aqueous extract of Leaf (high), Stem (medium), Aerial root (low).
- The alcoholic extraction of Aerial root (high), Stem (low), Leaf (low).
- The Hexane extraction of Stem (high), Leaf (medium), Aerial root (low).

So, by comparing all this, it has been concluded that the Aqueous and Alcohol were considered to be the best solvent in Extraction.

### B. Leaves and Stem Extraction of *Tinospora Cordifolia*

*Tinospora cordifolia*'s stem and leaves were collected. They were taken and washed with normal water gently to separate soil particles and other contaminants and again washed with distilled water. They were dried at 37 degree Celsius. The exposure of sunlight was avoided during this process, as it caused the plant to lose its phytochemical constituent. Then the dried sample was cut off into small pieces and grinded into powdered form. So, this powdered sample of plant was used for the extraction process.

### C. Procedure for Developing Herbal Clothing

- Whole plant of *Tinospora cordifolia* was dried under shade for about 20 days and pulverised using an electric grinder.
- 1 kg of *Tinospora cordifolia* powder was taken. The powder was mixed with the solvent of Ethanol (2 litres) in a container and kept in a dark room for about 24 hours.
- After 24 hours, the herbal extraction was taken using Whatman filter paper no 2.
- 4.5 litres of water and 90 ml of extraction was filled together in a container and allowed to heat with a temperature of 1500 to 1800 degree Celsius.
- After 15 mins, a full sleeve t-shirt (weight - 150 grams) was treated with that solution for about 1.5 hours.
- After 1.5 hours the garment was taken out, then squeezed and allowed to dry.

### D. END USES

The extracted solution may bonded to the textile material and have good improvement in applied particle

- Herbal clothing
- Band-aid
- Socks
- Wet wipes
- Wound healing

It has a good Anti-Ageing properties and it helps to compacting against pimples, dark spots and fine lines and it helps to consider as natural remedies to purify the blood, fight germs and bacteria. These techniques can provide valuable information about the properties and behavior of the microcapsules, which can be useful in understanding their potential applications. Bonding, or mechanical bonding. The resulting fabric has a number of properties that make it

attractive for use in various applications, including good strength, high tensile and tear resistance, and good dimensional stability.

### III. TESTING PROPERTIES

#### A. Anticancer Property

Stems of *Tinospora cordifolia* were dried under shade for about 7 to 10 days and then pulverized using an electric grinder. Then the dried sample was extracted with solvent of methanol and acetone in the ratio of 70:30 (4000 ml x 4 cycles) at 40 degree Celsius for about 16 hours in soxhlet apparatus.

Then the residue was dried under reduced pressure by using a rotary vacuum evaporator. It has been proved that the yield extraction of *Tinospora cordifolia* achieved some Protection against skin cancer.

#### B. Antimicrobial Property

The *Tinospora cordifolia* leaves were collected. The leaves were washed thoroughly and wiped carefully using cotton cloth without damaging the leaves. The wiped leaves were then shade dried for complete drying and upon drying the leaves were finely powdered using mortar. About 60 grams of shade dried powdered *Tinospora cordifolia* leaf was taken and divided into 3 groups of each 20 grams of leaf powder.

Then, each group received polar and aqueous extract. 50 ml of the appropriate solvents, such as ethanol, methanol, and aqueous extract, were used to soak the leaf powder. The obtained concentrated yield has been used to test the antimicrobial property. It has been proved that the ethanolic and methanolic extracts of the leaf showed a good zone of inhibition at 50 mg/ml.

The extract shown the presence of phytochemicals like tannins, phlobatannins, alkaloids, phenolic compounds, flavonoids, steroids, sugars, resins, aromatic compounds, minerals and various primary and modified compounds, that contribute to the expression of properties like antimicrobial, anti-inflammatory, anti-cancerous, protection against heart disease, infections and bodily discomforts.

#### C. Antibacterial Property

Fresh leaves of *Tinospora cordifolia* leaves were cleaned from extraneous materials, shade dried, powdered mechanically, weighed and stored in an airtight container. About 250 grams of powdered material was soaked in 1000 ml methanol for 72 hours in a beaker and mixture was stirred every 18 hours using a sterile glass rod.

Filtrate was obtained with the help of Whatman filter paper no 1 and the solvent was removed by rotary evaporator under reduced pressure at <45 degree Celsius temperature leaving a dark brown residue which was stored in airtight container at 4 degree Celsius until use.

The presence of glycosides, diterpenes, triterpenes, alkaloids, phenolic compounds and steroids as phytoconstituents. The extract was found to be safe for consumption and did not affect any other parameters.

#### D. Antiviral Property

Dried and powdered samples of *Tinospora cordifolia* (stem, leaves) were extracted by soxhlet hot extraction and cold maceration techniques with 250 ml of methanol, ethanol, and aqueous-methanol (50:50). The solutions were filtered

separately and the solvent was evaporated under reduced pressure.

It has been proved that the *Tinospora cordifolia* is the potential therapy against dengue as it holds a significant antiviral activity, and it has the effective and inhibitory antiviral activity against dengue virus and could inhibit the virus entry into the host cell.

### IV. CONCLUSION:

In the present work, *Tinospora cordifolia* was discovered to have extraordinary therapeutic effects. We prepared an extraction using the powder from the guduchi plant, which was then applied to fabric. After objective testing, it was found to have properties such as anti-fungal, anti-bacterial, anti-microbial. After subjective testing, it is concluded that the guduchi coated herbal clothing can be used to cure the fungal skin diseases. *Tinospora cordifolia* is a plant having various type of compounds.

Alkaloids, steroids, glycosides, sesquiterpenoids, and other bioactive substances have all been discussed. *T. cordifolia* exhibits anticancer, antiosteoporotic effects, antitoxic effects, wound healing, anticomplementary activity, immunomodulating activity, systemic infection, and Parkinson's disease. It also has antifungal, antioxidant, antimicrobial, antibacterial, antimicrobial, antiviral, and antifungal activity. It has been as used successfully in Ayurvedic medicine from the ancient era, its products are used for their better economic and therapeutic utilization. In this regards, for the further studies we need to carry out to explore *Tinospora cordifolia* for its potential in preventing and curing diseases.

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