



FORMULATION AND EVALUATION OF TINOSPORA CORDIFOLIA POWDER AND GRANULES

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Abstract

Giloy is considered one of the best medicines in Ayurveda for treating various fevers and other ailments. One of the three Amrit plants is Giloy. Amrit is the Sanskrit word for "source of immortality." As a result, it's also known as Amritavalli or Amrita in Sanskrit.. [1]

Since time immemorial, Guduchi (*Tinospora cordifolia* (Willd.) Miers) has been a highly appreciated plant in the Ayurvedic system of treatment. The essence or active part of a herb is called Satva or Sara, and it refers to the aqueous extractable solid substance gathered from herbal drugs. Guduchi Satva (a whitish starch-like material produced from *Tinospora cordifolia*) is widely suggested in diseases like Jwara (fever), Daha, and other herbal Satvas. The raw substance was collected between the months of December and January, as this is when more Satva is extracted. The Guduchi plant growing on Nimba was chosen since it is said to be the best because the synergy between these plants increases their potency. Yadavji Trikamji, Acharya, has mentioned use 'Angustha pramana' (thumb size) of Guduchi stem, accordingly thumb sized or medium size stem diameter (1.6-2.0 cm) was selected for study, as it is reported to yield more powder (Satva).. [2]

The microscopy of *Tinospora cordifolia* stem was performed and the several components of the T.S of stem like sclerenchyma cells, cortex, fibers, xylem vessels were observed under microscope. Test for identification of Microscopical character Eg. Iodine test, Conc. HCL+phloroglucinol test, HCl test, 60% sulphuric acid test was done.

The white starch material from the giloy stem was extracted and filtered, dried and converted in the form of fine powder of 2.24g. The powder is further used for granulation process. The Gum Tragacanth and Acacia are the binders used in formulation as binding agent with the distilled water and API and act as the additive in formulation. The standard formulation for granulation with Acacia is available in certain references. Tragacanth provides thixotropy to a solution (forms pseudoplastic solutions). The maximum viscosity of the solution is achieved after several days, due to the time taken to hydrate completely.

Tragacanth is stable at a pH range of 4-8. It is a better thickening agent than acacia. Tragacanth is used as a suspending agent, emulsifier, thickener, and stabilizer. The gum solution is stable under acid conditions and shows good emulsification characteristics. Hence, Gum Acacia is replaced by Tragacanth. By alteration of binding agent there is no change in granules size, texture, appearance.. [3]

The weight of granules from the white powder is 1.203g. The evaluation parameters for powder and granules like the tap-density, Bulk-density, Carr's index, Hausner's ratio, Angle of repose were performed. The prepared granules were filled and stored in wide mouth glass container.

Keywords:

giloy, ayurvedic, powder, granules, tragacanth

Introduction

Tinospora Cordifolia, or Guduchi in Hindi, is the scientific name for Giloy. Giloy's stem is said to be particularly useful due to its high nutritional content and alkaloids, but the root and leaves can also be employed. Giloy is one of the most common bitter herbs. It is used to treat a variety of ailments and aids in the relief of Vata and Kapha dosha. Because of its heart-shaped leaves and crimson fruit, Giloy is also known as Heart-leaved Moonseed..[4]

Scientific name- *Tinospora cordifolia*.

Family - Menispermaceae.

Biological source- It is obtained from Source the fresh ,ripe stem of Plant *Tinospora cordifolia*

Chemical constituents- *T.Cordifolia* contains high fiber (15.9%), sufficient protein (4.5%-11.2%), sufficient carbohydrate (61.66%) and low fat (3.1%). It has high potassium (0.845%), high chromium (0.006%), sufficient iron (0.28%) and sufficient calcium (0.131%) and important in various regulatory functions(5). They belong to different classes such as alkaloids,diterpenoid, lactones, steroids, glycosides aliphatic compounds, polysaccharides..[5]

The alkaloids include berberine, bitter gilonin, non-glycoside gilonin and gilosterol. The main alkaloid and secondary metabolites of giloy are tinosporine, tinosporide,tinosporaside heptacosanol and tinosporidine, which are effective in removing body toxins and improving immune system..[6]

Uses-

- Immunity booster
- Anti-toxic
- Giloy for chronic fever
- Giloy for hay fever
- Giloy for dengue fever
- Giloy for covid-19 in viral fever
- Controls blood sugar level
- Improves digestion
- Reduces stress and anxiety
- -treats arthritis and gout
- -improved respiratory health
- -improves eye-sight
- -youthful skin..[7]

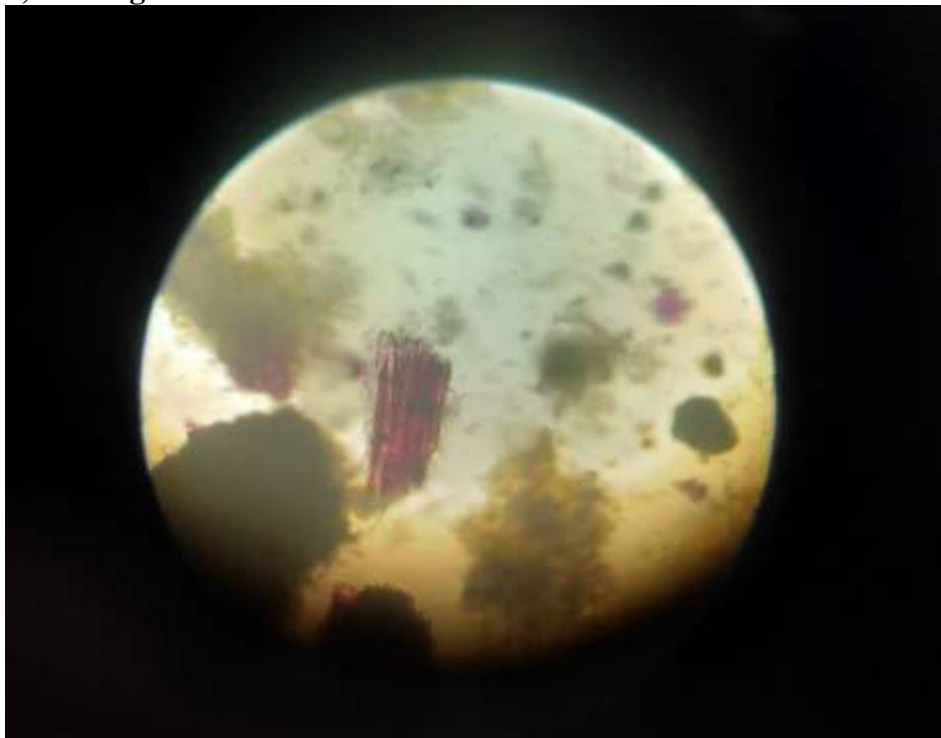
Macroscopy

Stem terete, scarcely lenticellate and often producing filiform aerial roots. Young stem green, with a smooth surface; older ones have a warty surface due to the presence of circular lenticels. Fracture fibrous. Taste intensely bitter and odorless...[8].

Microscopic characteristics-

Cork cells 2-3 layered followed by 2-3 layers of collenchymatous cortex and 4-6 layers of parenchymatous cortex, consisting of circular to isodiametric type of cells. Beneath the cortex, a ring of continuous pericycle composed of 4-6 layers of slightly thick walled, lignified fibres, capping the vascular bundle and medullary rays.

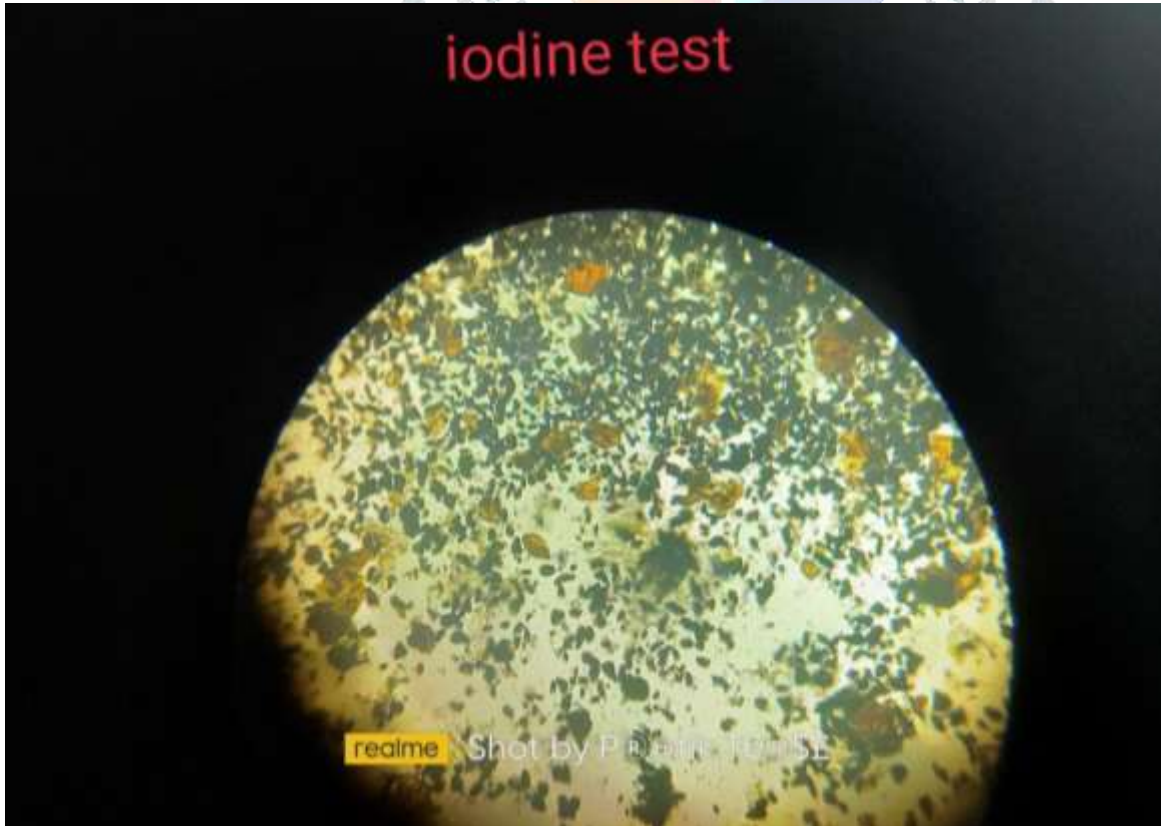
Fibres lignified, long with blunt ends. Tracheids with bordered pits, horizontal perforations. Tracheids fibres are longer than the tracheids. Xylem vessels cylindrical and bear bordered pits. Starch grains are present in parenchymatous cells....[9]

Microchemical Tests:**1, Phloroglucinol + Conc.HCL**

2. HYDROCHLORIC ACID:



3. IODINE:



Preparations from giloy-

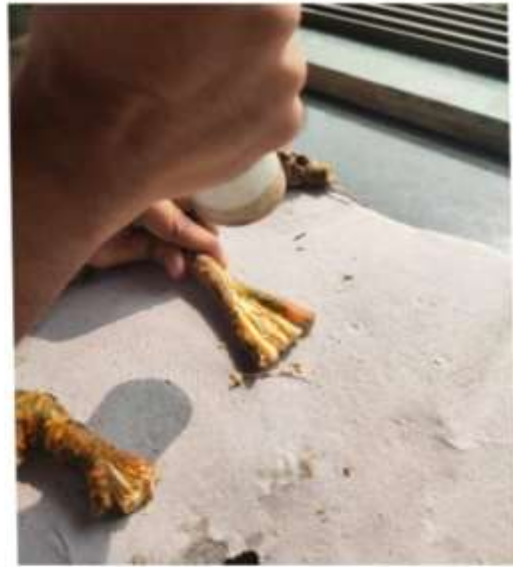
Requirements :-



Powder preparation (Guduchi satva)-

Procedure-

- Upto 5kg of fresh giloy stem were taken by removing the bark and it was pounded(crushed) in mortar and pestle.
- Then it was kept for soaking in water overnight (12 hr)
- Then the mass was macerated and kept for 1 hour and passed through Mesh150, so as to remove the impurities of stem or small particles of stem .The supernatant liquid was obtained after passing through mesh150 and it was kept undisturbed for about 5-6 hours.
- The supernatant liquid was filtered by filter paper and carefully collected the white smooth starchy sediment deposited on filter paper.
- This white and smooth starchy sediment was then kept under sunlight in lab for drying
- With this process we obtained 2.24 g of powder from 5 kg of giloy stem
- The quantity of powder differs with the quality of stems .As the thick stem contains more starchy material whereas thin and newly evolved stem contains less extract.





Organoleptic characteristics-

Colour- Clear white

Taste - Tasteless

Odour - not specific

Touch - Amorphous



Evaluation Parameters-

a) Angle of repose -:It is the maximum angle possible between the pile and horizontal plane .

It was easures by the formula:

$$\tan\theta=h/r=0.6/3=0.2$$

$$\tan\theta=0.2$$

$$\theta=\tan^{-1}(0.2)=11.30$$

b) Bulk density: It is the ratio of mass of the blend to bulk volume. It was measured by pouring powder in measuring cylinder and measuring the volume occupied by powder.

$$\text{Bulk volume}=7.5$$

$$\text{Bulk density}= \text{mass/Bulk volume}=2.24/7.5=0.29$$

c) Tapped density: It is the ratio of mass of the blend to tapped volume. It was measured by digital tap densitometer by measuring the volume occupied by powder after 100 standard tapping.

Tapped volume=7

Tapped density=mass/Tapped volume=2.24/7=0.32

d) Carr's index: It was measured by below formula

%compressibility=Tapped density–Bulk density/Tapped density x 100

=0.32-0.29/0.32 x 100

=9.32%

e) Hausner's ratio(HR): It was measured by below formula

H.R= Tapped density/Bulk density

=0.32/0.29

=1.103

Dose - 500mg to 1g oce or twice a day, or before or after food, or as directed by Ayurvedic doctor....[\[10\]](#)

Effect on Tridosha - Balances vata and pitta

Product expires after two years of manufacturing, once after opening the container, it is better to empty it within a month.



Granules preparation-

-The prepared satva was converted into granules with the help of 20 mesh sieve.

-Then the giloy satva was mixed with 1% tragacant and kept in oven at 50 degree until completely dried

-This granules were further evaluated and stored in wide mouth container



Evaluation Parameters-

a) Angle of repose -:It is the maximum angle possible between the pile and horizontal plane .

It was easures by the formula:

$$\tan\theta=h/r=0.6/2.75=0.2181$$

$$\tan\theta=0.2181$$

$$\theta=\tan^{-1}(0.2)=12.29$$

b) Bulk density: It is the ratio of mass of the blend to bulk volume. It was measured by pouring powder in measuring cylinder and measuring the volume occupied by powder.

Bulk volume=3.5

Bulk density= mass/Bulk volume=1.203/3.5=0.34

c) Tapped density: It is the ratio of mass of the blend to tapped volume. It was measured by digital tap densitometer by measuring the volume occupied by powder after 100 standard tapping.

Tapped volume=3

Tapped density=mass/Tapped volume=1.203/3=0.40

d) Carr's index: It was measured by below formula

$$\begin{aligned} \% \text{compressibility} &= \frac{\text{Tapped density} - \text{Bulk density}}{\text{Tapped density}} \times 100 \\ &= \frac{0.40 - 0.34}{0.40} \times 100 \\ &= 15\% \end{aligned}$$

e) Hausner's ratio (HR): It was measured by below formula

$$\begin{aligned} \text{H.R} &= \frac{\text{Tapped density}}{\text{Bulk density}} \\ &= \frac{0.40}{0.34} \\ &= 1.17 \end{aligned}$$



Pharmacological properties of giloy

- **Anti-inflammatory, Anti-arthritis and Anti-osteoporotic Activities**

In Ayurvedic texts, *T. cordifolia* is used to treat vatarakta (gouty arthritis) and daha (burning sensation). It has long been utilised in the treatment of rheumatoid arthritis in compound formulations. In models of acute and

subacute inflammation, the alcoholic extract of *T. cordifolia* has been found to have anti-inflammatory properties.

• **Anti-allergic Activity**

T. cordifolia is used to treat kasa (cough) and swasa (asthma), which are both described in various Ayurvedic texts. *T. cordifolia* has long been used to treat asthma, and the juice is also used to treat chronic coughs. Sneezing was reported to be completely relieved in 83 percent of patients treated with *T. cordifolia* in a clinical study. Similarly, 69 percent experienced alleviation from nasal discharge, 61 percent from nasal blockages, and 71 percent from nasal pruritus.

• **Antipyretic and Anti-Infective Activity**

As previously stated, *T. cordifolia* is known for its jwarahara (antipyretic) activity. Antipyretic activity was found in the water-soluble fraction of a 95 percent ethanolic extract of *T. cordifolia* plant. Antipyretic effects have been reported in the hexane- and chloroform-soluble portions of *T. cordifolia* stems in another experimental study. *T. cordifolia* has been shown to have remarkable anti-infective and antipyretic properties in various studies.

• **Anti-hyperglycemic Activity**

In Ayurveda, *T. cordifolia* is commonly used to treat diabetes mellitus. Various studies show that it improves experimental diabetic neuropathy and gastropathy in rats, lowers blood sugar in alloxan-induced hyperglycemic rats and rabbits, lowers blood glucose and brain lipids, improves glucose tolerance in rodents, improves glucose metabolism, and inhibits adrenaline-induced hyperglycemia.

Patients with diabetic foot ulcers who received *T. cordifolia* as an adjuvant therapy had a significantly better final outcome and wound healing.

• **Immunomodulatory Activity**

The alcoholic and aqueous extracts of *T. cordifolia* have been successfully tested for their immunomodulatory activity and have been reported to have beneficial effects on the immune system. In vitro, the aqueous extract of *T. cordifolia* was found to improve phagocytosis. In-vivo, both the aqueous and ethanolic extracts increased antibody production, and *T. cordifolia* extract (TCE) treatment reduced eosinophil count and improved haemoglobin in HIV patients....[\[11\]](#)

Role

Giloy stem can help improve digestion, reduce constipation, acidity, gas and bloating. It works well for people with a weak digestive system.

It also enhances the body's insulin response, this reduces the incidence of diabetes.

Not just this, the humble stem also reduces mental stress, boosts your memory and helps you calm down when it is consumed regularly.

- **Diabetes**
 - As per experts, giloy acts as a hypoglycemic agent and helps treat type 2 diabetes. Giloy juice has shown wonderful results in people with high blood sugar levels.
- **Arthritis**
 - Giloy has anti-inflammatory and anti-arthritic properties that can help treat symptoms of arthritis. To treat arthritis, consume giloy powder boiled in milk.
- **Improves vision**
 - In many places in India, Giloy powder mixed with water is applied on eyes as it is believed that it can help improve vision.
 - Boil giloy powder in water and let it cool down and then apply the paste on your eyelids....[\[12\]](#)

Toxicity

Tinospora cordifolia has a large biological potential, according to scientific studies. The extensive information offered in this review on the phytochemical and diverse biological features of the extracts is firmly thought to provide detailed evidence for the use of this plant in various therapies. *T. cordifolia* is used extensively in ayurvedic medicine to treat a variety of ailments.

T. cordifolia extract has been shown to have a positive immunomodulatory effect. It also has the ability to repair membrane damage caused by free radicals. It possesses hypoglycemic and hypolipidemic properties as well. It can also protect the liver from a variety of disorders. In acute toxicity tests, it was discovered to be non-toxic. Various types of studies have been carried out. Various investigations on *T. cordifolia* have revealed that it is an outstanding medicine that could be a good remedy for a variety of ailments in both animals and humans. However, the safety and possible indications in humans and animals must be established using modern methodologies....[13]

Future Scope-

Tinospora is available in powder, tablets, juice, and supplements, and can be consumed in any of these forms. *Tinospora cordifolia* may be utilised further as a source of important phytochemical substances for the pharmaceutical sector in the future. This plant species has enormous therapeutic potential, but it has been over-exploited as a result of human activity. As a result, there is a pressing need to conserve it. Plant tissue culture techniques offer a viable alternative to quick growth of this plant for conservation and the enhancement of secondary products.

Plant-collecting traditions and plant-based medicines have been passed down from generation to generation. The medicinal efficacy of plants acquired from various sources varies greatly. In recent years, India's indigenous drug sector has grown significantly. As a result, the demand for therapeutic plants has risen dramatically. According to the most recent estimates, there are around 8,000 licenced Indian Systems of Medicine pharmacies in the country, all of which are engaged in the creation of pharmaceuticals to suit the needs of the people. The total annual raw material requirement of these pharmacies was calculated in tonnes. Currently, the rising demand is met by either illegally cutting trees from their natural habitat and/or uprooting their trees/shoots/leaves for a fee, or by cutting trees from their natural habitat and/or uprooting their trees/shoots/leaves for a fee.

Human activities have over-exploited this plant species, which has enormous therapeutic potential. As a result, there is a pressing need to conserve it. Plant tissue culture techniques offer an alternative to rapid propagation for the conservation and promotion of secondary products of this plant. Fungal endophytes are a group of microorganisms that dwell within plant tissues and are normally asymptomatic. These organisms live in the host plant's living tissues and have a variety of associations with it, ranging from symbiotic to mildly harmful.

Scientists have recently discovered that phytodiversity may be exploited to make nanoparticles. The use of plant extract in the synthesis of noble metallic nanoparticles has been introduced as a green synthesis technology. This process for making nanoparticles is environmentally benign, inexpensive, and simple. These nanoparticles are used in a variety of applications including medication delivery, diagnostics, imaging, sensing, gene transfer, artificial implants, tissue engineering, and, more recently, medicinal textiles due to their antibacterial properties. We will have the opportunity to benefit from the plants in this manner.

Because of their extensive dietary diversity as heterotrophs and symbionts, they can live in a variety of environments. The use of endophytes in the synthesis of a variety of metabolites (primary and secondary) is now at the forefront of biotechnology, alongside other organisms. *T. cordifolia* was found to be associated with endophytic fungi. The metabolic and biochemical variety of these creatures in nature is one of the most important determinants in their biological success. This has allowed other creatures to adapt to and take advantage of distinct environments. Endophytic fungi have the ability to create a wide range of compounds that could be useful in modern medicine, agriculture, and industry.

As a result, more research is needed in the fields of tissue culture to improve success rates, molecular analysis of any genetic changes that occur as a result of indirect regeneration, exploration of a variety of fungal endophytes to reveal the exact pathway of natural product synthesis in plant cells, and nano biotechnology to solve the emerging problems of various incurable diseases through drug delivery systems....[14]

Conclusion

Giloy powder (Guduchi Satva) is a widely used formulation in Indian system of medicine as febrifuge and a general tonic. Guduchi Satva contains more or less starch granules and few alkaloidal phyto-constituents. The powder obtained from giloy consists of several properties like Antipyretic, Antidiabetic, immunity booster etc which can be consumed in different dosage forms like granules, tablets, capsules. The data obtained from the preparation of powder and granules can be taken as standard for the preparation of Giloy powder, granules at a laboratory scale and it may adopt for the future utilisation in pharmaceutical companies.

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