

Insulin Plant (*Costus igneus*)

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Costus igneus (or insulin plant) is a traditionally used medicinal herb which is native to Southeast Asia. The plant has been recently introduced into India and it is grown as an ornamental plant in south India. Insulin plant contains various phytochemical constituents like steroid, alkaloid, flavonoid, triterpene, glycoside, and saponins. Its leaves are being used as a dietary supplement in the treatment of diabetes mellitus. The catchphrase of the plant is: a leaf a day keeps diabetes away. Various pharmacological activities include antidiabetic effect, antiproliferative potential, antimicrobial activity, antiurolithiatic property anti-inflammatory potential, its effect on learning and memory, antioxidant activity, neuroprotective role, hypolipidemic activity etc. The attempts to explore various medicinal properties of *Costus igneus* (insulin plant) for research purposes and its suitable formulation development in the future for the welfare of mankind.



Keywords: Insulin plant, Leaf, Phytoconstituents, Ayurvedic use, Pharmacological activities.

Introduction

Costus belongs to the family Costaceae, commonly known as insulin plant in India because its leaves help to build up insulin in the human body. Since oral hypoglycaemic agents possess various side effects, there is a growing demand for herbal remedies for the treatment of diabetes mellitus. Many plant preparations are used in folklore and traditional system of medicine to manage diabetes mellitus. Investigation on new oral hypoglycemic compounds from medicinal plants will set a milestone for the development of pharmaceutical entities or as a dietary adjunct to existing therapies in the future. Insulin plant is one such traditional plant which is getting global acceptance nowadays and is now widely used as an ayurvedic medicinal herb. Consumption of the leaves are believed to lower blood glucose levels, and diabetics who consumed the leaves of this plant said to have a fall in their blood glucose levels. Insulin plant is native to Southeast Asia, especially on the Greater Sunda Islands in Indonesia. It is relatively a new entrant to India and is being grown as an ornamental plant in Kerala. In the Ayurvedic system of medicine, diabetes is traditionally treated by chewing the plant leaves for a period of one month to get a controlled blood glucose level.

Botany

Costus igneus N.E. Br. is a perennial, upright, tropical evergreen plant belongs to the family Costaceae. Possesses evergreen leaves which are simple, alternate, entire and oblong, having 4-8 inches length with parallel venation. The large, smooth, dark greens leaves possess light purple undersides and are spirally arranged around stems, forming attractive, arching clumps

arising from underground rootstocks. It reaches a height of about 60cm with the tallest stems falling over and lying on the ground. Beautiful orange flowers are produced in the warm months having a 2.5-12.5cm diameter, appears on cone-like heads at the tips of branches. Propagation of insulin plant is by stem cutting. Common names: Fiery Costus, Spiral flag, Insulin plant, Step ladder.

Chemical constituents

Phytochemical screening showed the presence of steroids, triterpenoids, alkaloids, tannins, flavonoids, glycosides, saponins, carbohydrates, and proteins. The methanol extract was found to contain the highest number of phytochemicals. Wild plant and callus (MS and LS medium) extracted with different solvents in preliminary screening indicated the presence of high content of phytochemicals like phenols, alkaloids, flavonoids, and terpenoids in methanolic extracts. And the sequential screening for phytochemicals of Costus leaves revealed that it is rich in protein, iron, and antioxidant components such as ascorbic acid, α -tocopherol, β -carotene, terpenoids, steroids, and flavonoids.

Medicinal Use in Ayurvedic System

Leaves: The diabetes patients have to chew down the Insulin plants leaves for a month. That is the patient has to take two leaves per day in the morning and evening for one week. Care should be taken that the leaves must be chewed well before swallowing. Then after one week, the patient should take one leaf each in the morning and evening. This dosage should be continued for 30 days. Allopathic doctors also recommend this and are found to be effective in bringing blood sugar levels under completely under control. The catchphrase of insulin plant is a leaf day keeps diabetes away.

Rhizome: The rhizome of insulin plant is considered as a bitter, astringent, acrid, cooling, aphrodisiac, purgative, anthelmintic, depurative, febrifuge, expectorant and useful in burning sensation, constipation, leprosy, worm infection, skin diseases, fever, asthma, bronchitis, inflammations, and anemia.

Cultivation of insulin plant

- Climate and Soil Requirements :The Insulin Plant (*Costus igneus*) requires a temperature range of 20-30°C (68-86°F) and humidity levels between 60-80% to thrive, with well-draining acidic to neutral soil (pH 5.5-7.0).
- Propagation Methods: The Insulin Plant can be propagated through stem cuttings, rhizome division, or seeds, with stem cuttings being the most effective method.
- Sowing and Nutrient Management: To cultivate the Insulin Plant, plant spacing should be 30-60 cm (12-24 inches) apart, with regular watering, balanced fertilization (10:10:10 NPK), and pruning to maintain shape and promote growth.
- Growth Stages: The Insulin Plant undergoes four growth stages: germination (1-2 weeks), seedling stage (2-4 weeks), rhizome formation (6-12 months), and flowering stage (12-18 months).
- Harvesting Leaves can be harvested individually or in stems as needed, while rhizomes are harvested after 12-18 months, dried, and processed for medicinal use.

Market status of insulin plant

Insulin plant, called Fiery Costus or Spiral Flag or Cengalva Kostu in Telugu, is the major oriented medicinal crop cultivated in Telangana. It was reported to have been cultivated in as many as 1447 hectares and was cultivated in 35 hectares in 2015-2019. The area has declined over years at a rate of 41.15%. Marketing of Insulin plant is not properly organized. The channel consists of the producer, the village merchants, and the exporters, with the commission agents also having a role to play. Based on the demand for the Insulin plant from the overseas buyers, the exporters fix a price and purchase the Insulin plant, leaves, and

Rhizome from the farmers and village merchants. It processes in dried and ground powder of the leaves now available in the market to export through containers. With the worldwide prevalence of diabetes increasing at a compound annual growth rate of 7.6 percent, the insulin market is growing as well, at a rate of 12.9 percent sales increase in 2012. Lack of information on insulin sales volume, although the Global and Chinese Insulin Industry Report had market share based on pieces (vials) produced by each manufacturer. Despite the size of the global market in terms of value, it is largely dominated by three pharmaceutical companies: Danish-based Novo Nordisk, French-based Sanofi, and American-based Eli Lilly. Intensifying Strategic Alliances. Between Companies presents a comprehensive analysis of market size by value of major types of insulin consumed in India. The report entails the segment-wise market share analysis and company profiles of major players in the insulin market in India. The Indian insulin market is witnessing the development and has yet to mature. With a huge base of diabetic patients, it is anticipated that only 25% of this population is receiving treatment. Unawareness backed by low affordability has left the major proportion of the diabetic populace to remain untreated. However, since higher disposable income is increasing the accessibility to healthcare services, enhanced diagnostics will further broaden the patient base, creating opportunities for insulin companies operating in India.

Benefits of insulin plant

- **Anti-Diabetic Effects:** *Costus igneus* is a traditionally used medicinal plant and a common member of ornamental plants in south Indian gardens. Leaves are the important part which produces significant anti-diabetic activity. It reduces fasting as well as postprandial blood glucose levels. But the exact mechanism of action behind the anti-diabetic activity is not known yet. Along with the anti-diabetic activity, insulin plant also reduces the diabetic-associated complications, decreases the amount of glycosylated haemoglobin, corrects the lipid profile, increases body weight as well as insulin level, brings renal, hepatic parameters to a controlled level, and shows marked improvement in the histopathological examination.
- **Reduce Cholesterol Level:** The insulin plant leaves not only reduce the blood sugar level but also make a great impact on the blood sugar level. When the diabetic patient intakes these leaves, it induces the cholesterol level down. This is because the insulin plant has a high amount of water and water-soluble content that slows down the glucose absorption into the blood from the digestive system. It will give better assimilation and fat absorption for reducing the blood cholesterol level in the body.
- **Insulin Plant has Antibacterial Property:** The insulin plant has a good level of antibacterial properties that can effectively fight against several gram-positive species. People who have a problem with their urination process can regularly consume these leaves for positive results. The insulin leaves extract will effectively kill the bad bacteria in the urinary pipe. Furthermore, it automatically smoothens the excretory function and gives better relief, but you have to drink a lot of water to extract it.
- **Maintains Bladder Health:** The problems in the bladder may be caused due to many reasons, such as lack of water or virus infection in the urinary tract. The diuretic compounds in the insulin plant help to improve bladder health. Keeping the bladder healthy is very important; otherwise, it causes some serious infections. The leafy extract of an insulin plant regulates the urination process.
- **Boosts Immunity:** Insulin plant leaves naturally have antioxidant property, which automatically encourages the immune system by eliminating the free radicals from the body. By having a well-maintained immune system, you can live a healthy lifestyle.

- Reduces Blood Pressure: Consuming the leaves of this herb will reduce blood pressure levels. Drinking the insulin leaves potion is good therapy for high blood pressure. Drinking insulin leaves potion is good therapy for high blood pressure

Contraindication

This floral plant can also lead to side effects like dizziness, diarrhea, nausea — even dangerously low blood sugars if it interacts with your other diabetes medications.

Conclusion

Costus igneus is an important medicinal herb presented with various pharmacological actions. The studies have done on this plant proved that it possesses many important phytoconstituents such as conjugated flavonoids, flavones, flavonols, catechin and catechin derivatives, chlorophylls a and b, resinoids, essential oil, and alkaloid named saussurine, inulin and resin etc. And these compounds found to be responsible for various pharmacological properties such as antidiabetic effect, antiproliferative effect, antimicrobial activity, antiurolithiatic property, anti-inflammatory potential, the effect on learning and memory, antioxidant activity, neuroprotective Role, hypolipidemic activity etc. Further exploration of medicinal properties and various phytoconstituents responsible the pharmacological actions are required to be done to make the treatment more assuring, reliable, with fewer side effects for the welfare of mankind in the future.