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Review Article

Natural Solutions to Diabetes: A Review on the Medicinal Properties of the Insulin Plant

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ABSTRACT

The present investigation was aimed to determine the "Study on Marketing of Medicinal Plants (Insulin Plant) [6] This plant mostly known as a decorative plant in India, Costus igneus, it is often called the spiral flag is a member of the Costaceae family and has become known as the "insulin plant"[5] Consumption of the leaves are believed to lower blood glucose levels, and diabetics who consumed the leaves of this plant did report a fall in their blood glucose levels.[1] C. igneus is valued for its bioactive compounds, including flavonoids, tannins, alkaloids, and terpenoids, which exhibit potent antihyperglycemic activity.[2] Secondary metabolites of this plant such as b-sitostirol, corosolic acid, diosgenin, quercetin, catechine, oleic acid show mainly anti-diabetic activity.[8] The herb is becoming more popular as a medicine in the current decade. It has been applied to treat many disorders.[3] This review provides a comprehensive examination of the phytochemical composition, mechanisms of action, and therapeutic potential of C. igneus in managing diabetes mellitus.[2] This plant is a perennial, upright, and spreading, growing to a height of two (2) feet with the tallest stems falling and lying on the ground.[4]India is the most Producing country in the world and Telangana is one of the important Insulin plants producing states, in Hyderabad District in Telangana. It covers 50-60 percent of the nurseries in the study area.[6]

INTRODUCTION

Costus igneus, commonly referred to as the "Insulin plant," is a perennial herb known for its medicinal properties, particularly in managing diabetes.[2] Nature has provided a complete store house of remedies to cure all ailments of mankind. As man began to acquire the closure acquaintance with his environment, he began to know more about the plants as these were the only curative agents he had [3]. *Costus igneus*, additionally referred to as the Spiral flag, generally grows as a decorative plant. Its leaves are used as a nutritional complement withinside the remedy of diabetes

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(Hegde et al., 2014). It is a prostate developing plant with spreading root system. Leaves are narrow and lance formed with toothed, scalloped, or lobed margins stained with red pink above and darker pink beneath. The tiny flora develops intermittently during the year.[4] *Costus igneus* is primarily noted for its hypoglycaemic action, aiding in the management of Type I diabetes by enhancing insulin production from pancreatic beta cells (Kaki & Savino, 2023)(Arivu et al., 2023). Beyond its anti-diabetic effects, *Costus igneus* exhibits anti-oxidant, anti-inflammatory, and anti-lipidemic properties, making it a versatile medicinal plant (Sarkar & Roy, 2023)(Vijaya et al., 2022).[6] Herbal products are extensively used globally for the treatment of many diseases where allopathic fails or has severe side effects. Psycho neural drugs are also have very serious side effects like physical dependence, tolerance, deterioration of cognitive function and effect on respiratory, digestive and immune system.[8] It is used in India to control diabetes, and it is known that diabetic people eat one leaf daily to keep their blood glucose low. In Mexican folk medicine, the aerial part of C. Pictus D. Don is used as an infusion in the treatment renal disorder.[8] *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 branches2. Propagation of insulin plant is by stem cutting1.[11]

Common names: Fiery Costus, Spiral flag, Insulin plant, Step ladder3.

MORPHOLOGY

Morphology of the plant:-

Costusigneus is a tropical, straight, perennial plant belonging to the costacea family. It spreads to about two feet tall, with the tallest stems falling over and resting on the ground.[2] Here are some morphological features of the *Costus igneus*, also known as the insulin plant:

- **Growth Habit:** The insulin plant is a perennial herb that grows upright and spreads, typically reaching about two feet in height.
- **Leaves Arrangement:** Leaves are arranged spirally around the stem.
- **Shape:** They are oblong, meaning they are longer than they are wide.
- **Size:** The leaves are typically 4-8 inches long.
- **Venation:** The veins run parallel to each other.
- **Color:** The upper surface is dark green, while the underside is light purple.
- **Texture:** The leaves are smooth and fleshy.
- **Flowers Color:** The flowers are orange.
- **Shape:** They are borne on cone-like heads at the tips of the branches.
- **Size:** The flowers are about 1.5 inches in diameter.
- **Season:** They are produced during the warmer months.
- **Stems:** The tallest stems may eventually fall over and lie on the ground.
- **Underground Structures:** The plant has underground rootstocks from which the clumps of leaves arise.
- **Roots:** Grouped around stems, they form graceful, arching bunches that emerge from underground rootstock.

- **Fruits:** The fruits are small, green, and not very noticeable.

CHARACTERISTICS FOR INSULIN PLANT...

- **Growth Habit:** Perennial, upright, and spreading, reaching about two feet in height.
- **Leaves:** Large, smooth, dark green leaves with a light purple underside. They are spirally arranged around the stem.
- **Flowers:** Orange-yellow, 1.5 inches in diameter, appearing on cone-like heads at the tips of branches.
- **Native Region:** Central and South America.
- **Cultivation:** Widely cultivated in India, particularly for medicinal use.
- **Medicinal Uses:** Traditionally used for managing diabetes due to its potential to regulate blood sugar levels.
- **Other Properties:** Possesses antioxidant, anti-inflammatory, and digestive health benefits.





CHEMICAL CONSTITUENTS

Phenols, alkaloids, flavonoids, terpenoids, steroids, saponins, and glycosides.

SCIENTIFIC CLASSIFICATION

Botanical name:	*Costus igneus* N.E.Br Domain: Eukaryota
Kingdom:	Plantae
Subkingdom	Viridaeplantae
Phylum:	Tracheophyta
subphylum:	Euphyllophytina
Infraphylum:	Radiatopses
Class:	Liliopsida
Subclass:	Commelinidae
Superorder:	Zingiberanae
Order:	Zingiberales
Family:	Costacceae
Subfamily:	Asteroideae
Tribe:	Coreopsideae
Genus:	Costus
Specific epithet	Igneus

PHARMACOLOGICAL ACTIVITY

The insulin plant, also known as *Costus igneus*, has several pharmacological activities that make it beneficial for managing diabetes and overall health. Some of its key properties include [1] [2] [3]:

- **Hypoglycemic Effects:** The plant's extracts help regulate blood glucose levels, making it recommended for people with prediabetes or type 2 diabetes. Corosolic acid, a compound found in the plant, enhances insulin sensitivity and promotes glucose uptake into cells, effectively lowering blood sugar levels.
- **Anti-Inflammatory and Antioxidant Properties:** The insulin plant contains flavonoids and other antioxidants that help reduce oxidative stress and inflammation, which are key contributors to insulin resistance and diabetes complications. These properties also support heart health and digestive health.

- **Diuretic and Purifying Effects:** The plant contributes to the elimination of fluids and toxins, which can be beneficial for overall health.
- **Neuroprotective Effects:** The antioxidants in the insulin plant promote memory and learning, potentially supporting cognitive function.
- **Healing and Antiseptic Properties:** The plant accelerates the healing and disinfection of minor wounds.
- **Improves Insulin Sensitivity:** Corosolic acid improves the body's response to insulin, helping cells absorb glucose more efficiently. This can lead to better blood sugar control and potentially reduce the need for insulin or other medications.
- **Supports Digestive Health:** The insulin plant acts as a natural prebiotic, promoting the growth of beneficial gut bacteria and aiding in digestion.
- **Cardiovascular Health:** The plant helps reduce LDL (bad) cholesterol while maintaining HDL (good) cholesterol levels, supporting overall heart health.

BENEFITS OF INSULIN PLANT

- Help to lower blood sugar levels
- Stimulate the pancreas to produce more insulin
- Improves digestion
- Reduces cholesterol levels
- Increase energy levels
- Promotes weight loss

SIDE EFFECTS

- Upset stomach
- Diarrhoea
- Dizziness
- Low blood sugar levels, especially if you take insulin
- Increased risk of diabetes-related coma (from hypoglycaemia)

CONCLUSION

The papers reviewed provide ideas on how the insulin plant can be used to develop pharmaceutical products or as a dietary combination to current therapies in the future. Since oral hypoglycaemic drugs show several side effects, there is a growing demand for herbal products to treat diabetes mellitus.(9) *Costus igneus*, often referred to as the "Insulin Plant," has demonstrated significant therapeutic potential due to its diverse phytochemical composition. Rich in flavonoids, terpenoids, and essential nutrients, this plant offers a natural approach to managing diabetes and associated complications.(2) 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 of welfare of mankind in the future.(11) Insulin plant leaves and their phytochemical constituents show the promising effect of the in silico method of study and not to forget that there is a need to investigate further their actions towards Diabetes mellitus treatment as a dietary supplement or conjugating with synthetic anti-diabetic drugs for better therapeutic action and less side effects. Future research is suggested for the advances in the novel formulation of insulin plants using each isolated

compound and improving bioavailability, therapeutic effect, and delivery of the drug.(9)

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