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An Extensive Review on Hedychium Coronarium J. Koenig

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ABSTRACT:
Hedychium coronarium J. Koenig, commonly known as White Ginger lily, Dolan Champa, is a robust perennial herb originating from the Himalayan belt and extensively grown in warm and moderately warm ecological zones. The species develops from a thick rhizomatous base and typically reaches 3–6 feet in height. Its distichously arranged leaves, wavy margins, and highly fragrant white blossoms—prominent during the monsoon and autumn—make it an economically and medicinally important plant.
Phytochemical investigations revealthe plant contains saponins, glycosides, flavone-based compounds, essential oils, fats, with major bioactive constituents such as hedychenone etc. Traditionally, the rhizome is utilized for conditions such as diabetes, colds, inflammatory disorders, neuralgia, and rheumatic pain, while contemporary studies highlight its anticancer, antioxidant, antihypertensive, diuretic, leishmanicidal, and antimalarial properties. Ethnomedicinal reports also associate the rhizome with management of menstrual discomfort, piles, and urinary calculi, indicating its relevance for modern pharmacological research.
Keywords: Hedychium coronarium, Glycosides, Flavonoids, Hedychenone .

I. INTRODUCTION

Plants-based agents used to managing illnesses for numerous generations, especially in traditional healing systems. People continue to rely on them because they are natural, affordable, and often effective. One such plant is Hedychium coronarium, popularly called the white ginger lily. Broadly used within traditional medicine across South and Southeast Asia, where different parts of the plant are valued, but the rhizome is considered the most useful for healing.

Traditional practitioners use the rhizome to relieve cough, cold, chest congestion, headaches, swelling, and pain related to muscles and joints. Over time, scientific studies have also supported several of these uses. Some communities also use it for problems like piles, irregular menstrual cycles, and urinary issues.

Botanically, H. coronarium is a perennial herb with thick rhizomes and tall green leaves. It produces beautiful and strongly fragrant white flowers during the rainy season and early autumn. The plant naturally grows in warm, moist places such as forests, riverbanks, and wetlands.

Although the plant is extensively applied in traditional medicinal practices like Ayurveda, many by virtue of its uses still need stronger scientific proof. The plant contains many important phytochemicals, which suggests that it may offer new medicinal compounds in the future. More detailed research could help confirm its traditional benefits and explore its value in modern medicine.

Synonyms :
Across different geographical regions, Hedychium coronarium is recognized by a variety of local names.
Hindi : Dolan Champa, Kapoor Kachari.
Marathi : Sontakka.
English : White ginger, butterfly lily, ginger lily, white butterfly.

Hedychium coronarium: Essential Information :

Hedychium coronarium is a well-known ornamental, medicinal plant valued for its fragrance and therapeutic potential. Belonging to the Zingiberaceae family, it shares its lineage with several other important aromatic and medicinal ginger species. The plant is easily recognized by its lush green foliage and fragrant white flowers, which are often used in cultural rituals, perfumes, and traditional healing practices.

This species grows well in a range of light conditions, performing best in full sunlight but also able to adapt to partially shaded areas. Its ability to thrive in different lighting makes it suitable for gardens, home landscapes, and natural wetland environments. Under ideal growing conditions, H. coronarium can reach a height of about 2 to 12 feet, giving it a tall and graceful appearance.

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The plant requires moderate watering, with moist but well-drained soil supporting its rhizome development and overall health. Although it is not extremely demanding, it does need a medium level of care—regular watering, occasional pruning, and protection from harsh environmental stress help maintain vigorous growth. Its adaptability along with its benefits make H. coronarium largely cultivated globally. [10]

Figure 1: Plant of H. coronarium

Figure 2: Flower of H. coronarium

Figure 3: Yellow Ginger lily

Figure 4 : Red ginger lily

Botanical Description :

H. coronarium is a small perennial herb native to India and Indonesia. The plant usually reaches about 2–5 feet in height and width, thriving best in deep or light shade and preferring humid, loose, well-drained soil. It blooms during summer and autumn, producing pleasantly fragrant white or creamy flowers that attract butterflies and hummingbirds.

In regions such as Hawaii and other Pacific islands, its flowers are frequently used for crafting leis or as decorative hair ornaments. They are also popular as cut flowers for enhancing indoor fragrance. This perennial species is erect and unbranched, growing from a dense rhizome system

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that can reach 3–6 meters in vertical growth. The leaves are simple and loosely positioned, alternating along two rows, with sessile blades at the top of the leaf sheath that vary in shape from elliptic to lanceolate.

The leaves typically measure 20–30 × 3–10 cm, with a slightly hairy underside. Flowering occurs throughout the year, featuring blossoms arranged in clusters of one to six, enclosed within large green bracts and forming a cylindrical spike 7–20 cm long at the tip of the stem. The flowers consist of a slender tube 8–9 cm long, and the segments are linear, usually 3–5 cm in length.

The plant bears two narrow, lanceolate petal-like staminodes measuring 3.5–5.5 cm, and a broader, rounded labellum that is slightly longer and distinguished by a central yellowish-green or dull white mark and a shallow notch at the tip. Its fruits form oblong capsules containing numerous seeds.

Its functions as an annual, branching herb in wastelands and tropical habitats, particularly flourishing during and after the rainy season. Although it grows best in moist areas, it can be found in diverse environments such as forests, riverbanks, wetlands, roadsides, and open fields.[11,12]

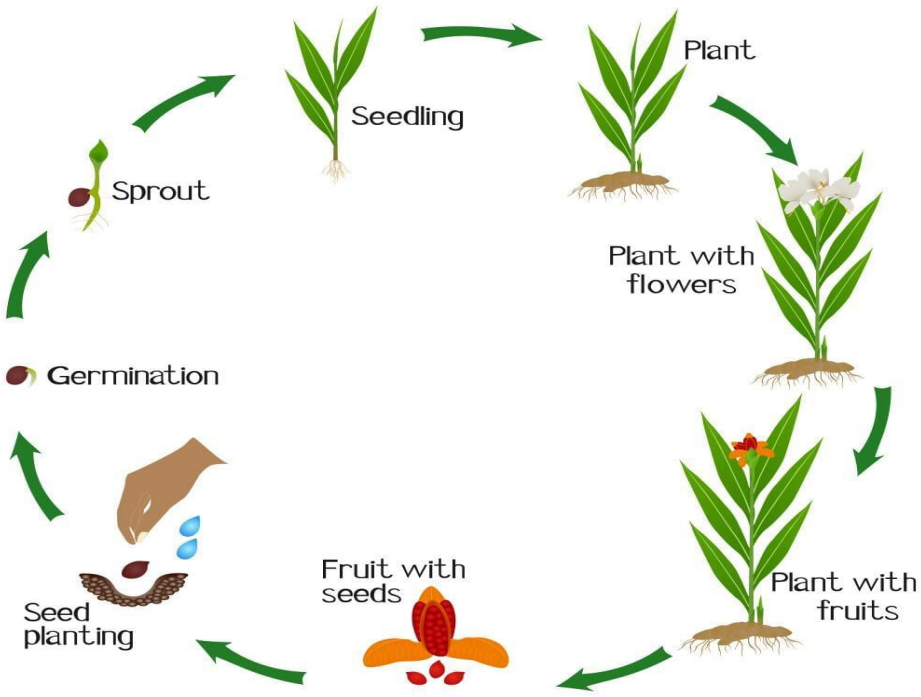

Figure 1 :Developmental stages of H. coronarium

Phytochemical Characteristics :

Hedychium coronarium contains an extensive range of bioactive molecules, including saponins, glycosides, volatile oils, fats, and various other secondary metabolites. Key compounds identified in this species include hedychicoronarians etc.[13,14]

Some these constituents, such as hedychicoronarians and peroxycoronarin D, are present as optically active, colorless oils. Studies on the rhizomes have also revealed benzoyl eugenol and several labdane diterpenes, including isocoronarin D and ethoxycoronarin D. Essential-oil analyses show that the plant's oil contains major compounds.[15-17]

Research conducted in various geographical regions suggests that the phytochemical composition of H. coronarium can vary significantly depending on the plant part and the origin, even though monoterpenes and sesquiterpenes remain the main chemical groups. [18,19]

Pharmacological Activities :

1. Anti-Inflammatory Activity :

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Extracts of Hedychium coronarium rhizomes prepared through solvent extraction have been evaluated for their pain-relieving and inflammation-reducing in preclinical models. The same extracts also increased tail-flick latency, indicating enhanced analgesic activity.

Moreover, in the carrageenan-induced paw edema study, chloroform and methanol extracts produced a clear reduction in inflammation, demonstrating significant anti-inflammatory potential. [20,21]

2. Anti-Oxidant Activity :

Antioxidants are essential in preventing oxidative damage, thereby helping prevent major chronic diseases. Antioxidant capacity of H. coronarium has been evaluated primarily through the DPPH scavenger test, a widely accepted method for assessing the hydrogen-donating ability of phytochemicals.

The root extract recorded 18.92 µg/mL, both demonstrating higher activity than standard ascorbic acid. During these analyses, 8α-hydroxyhedychilactone was isolated as a major antioxidant constituent. Structural elucidation using IR, NMR, and mass spectrometry confirmed its identity. These findings establish H. coronarium as a rich source of natural antioxidant molecules. [22,23]

3. Cancer Chemopreventive Activity :

Several studies have explored the chemopreventive potential of H. coronarium, particularly focusing on labdane diterpenes isolated from its rhizomes. These compounds were evaluated in various in-vitro systems for their ability to suppress carcinogenesis.

The extracts demonstrated significant inhibitory effects on key cancer-related pathways, including NF-κB, COX-1, and COX-2. Additionally, they promoted activation of the antioxidant response element (ARE), which enhances cellular defense mechanisms. The lipophilic nature of certain labdane diterpenes contributed to enhanced NF-κB inhibition while maintaining low cytotoxicity. These results suggest that H. coronarium possesses promising chemopreventive properties. [24]

4. CNS Depressant Activity :

The central nervous system (CNS) depressant effects of H. coronarium have been examined using methanolic rhizome extracts in animal behavioral models. Administration of the formulated extract produced a clear amount-responsive reduction in locomotor activity and exploratory behavior in mice.

These observations indicate that the plant exhibits CNS-depressant properties, possibly mediated through modulation of neurological pathways. This highlights its potential role in the development of herbal sedatives or calming agents. [25]

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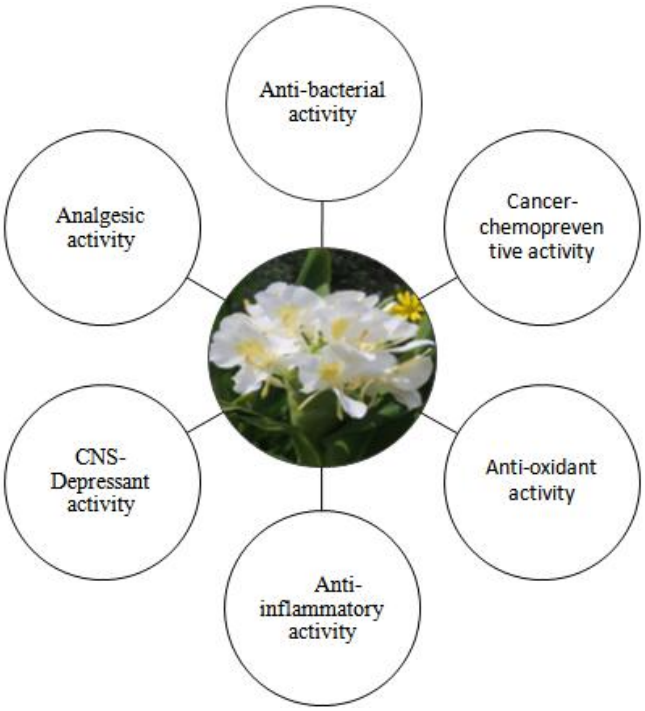

Figure 2: Pharmacological activities of H. coronarium

Ethanomedicinal Uses :

Across the country, H. coronarium is valued for its ethnomedicinal applications. Boiled leaves are used to manage indigestion, high blood pressure, stiffness, and joint pain. [26] The rhizomes serve as a remedy for headaches, and paste is utilized externally to manage snake bites. [27] The blossoms are used to relieve fever and joint inflammation, while in Bangladesh, the plant is traditionally taken for jaundice. A decoction of the rhizome is consumed to reduce fever and ease chest pain, and its paste is applied to soothe insect bites. [28-31]

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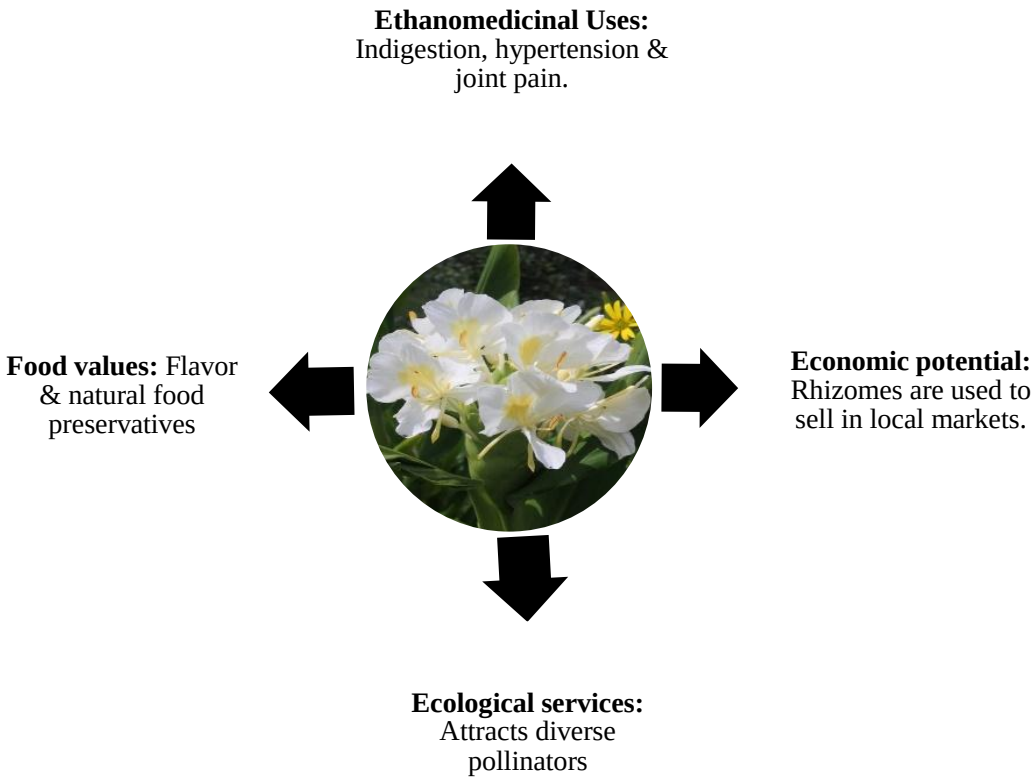

Figure 7 : Various uses of Hedychium Coronarium

Other Uses :

Oil derived from the rhizome is used in creating fragrances and as a natural food preservative. In Manipur, India, it is easily found in markets, where the blossoms and rhizomes are consumed as vegetables. Moreover, its flowers and stems are commercially utilized in the production of perfumes and paper. [32,33]

1. Therapeutic and Traditional Uses :

In various traditional medical systems, preparations derived from H. coronarium have been administered for multiple ailments. The rhizome extracts are known for alleviating inflammation, mild respiratory discomfort, and digestive disturbances. The presence of terpenoids, flavonoids, and phenolic constituents supports its reported antimicrobial, anti-inflammatory, and antioxidant actions.

2. Aromatic, Cosmetic, and Perfumery Value :

The fragrant blossoms of H. coronarium are one of its most celebrated features. The oil obtained from the flowers, rich in monoterpenes, aromatic compounds, is widely incorporated into perfumes, scented personal-care items, incense products, and spa formulations. Owing to its fresh and long-lasting fragrance, the plant is frequently used in aromatherapy and cosmetic industries. [34]

3. Ornamentation and Ecological Uses :

The species is popular in landscaping owing to its striking white flowers and lush green foliage. It adapts well to moist soils, making it ideal for wetland gardening and habitat restoration. The extensive rhizome network aids in soil stabilization, providing natural protection against erosion in environmentally sensitive areas.

4. Mosquito Control and Insecticidal Potential :

Numerous studies have demonstrated the activity against larvae of H. coronarium extracts. Key compounds contribute significantly to this bioactivity. The plant's essential oil is increasingly

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recognized as a potential source of biodegradable insect-control compounds, functioning as an eco-conscious substitute for synthetic bioactive compounds larvicides. [35]

5. Cultural and Regional Uses:

In several cultural settings, the flowers of H. coronarium hold ceremonial importance. They are used in religious offerings, traditional rituals, and festival decorations owing to their purity, fragrance, and aesthetic appeal. In some regions, young plant parts are used in local culinary practices.

6. Industrial and Value-Added Applications:

Beyond medicinal and aromatic uses, the plant shows promise in a growing number of industrial applications. Its phytochemicals are being explored for their potential in natural preservatives, plant-based dyes, herbal formulations, and biodegradable materials. Such versatility highlights the plant's economic and technological relevance. [36,37]

II. CONCLUSION:

The findings suggest that Hedychium coronarium is a significant plant with medicinal, nutritional, ecological, and economic importance. In Manipur, its rhizomes are commonly eaten as a vegetable. The species also contributes to ecological balance by attracting a wide range of pollinators. Traditionally, it is widely used for medicinal purposes such as relieving headaches, joint pain, and jaundice. Hence, its potential nutraceutical benefits and its role in developing drugs for various health issues highlight its value as a promising resource.

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