International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 5 Sep-Oct 2023, pp: 627-631 www.ijprajournal.com ISSN: 2249-7781

Geographical Distribution and Explored Pharmacological Potentials of Martynia Annua .A Review

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Submitted: 25-09-2023 Accepted: 05-10-2023

ABSTARCT
Martynia annua, commonly known as Martynia, Devil's Claw, or Unicorn plant, is an annual herb native to tropical regions of Central and South America. In traditional Indian medicines, M. annua has been used for treating epilepsy, inflammation, and tuberculosis. This plant's various parts, including seeds, roots, stems, leaves, and flowers, have been explored for their pharmacological potential, showing promising properties such as analgesic, anti-inflammatory, wound healing, antifertility, and antioxidant effects. Additionally, M. annua exhibits antibacterial and anti-inflammatory activities, making it a potential candidate for therapeutic applications. Furthermore, the plant's stem bark and leaves have demonstrated immunomodulatory potential, stimulating defense systems by modulating immunological parameters. The comparative antioxidant potential of its stem and leaves reveals that the n-butanol soluble fraction of the stem and the ethyl acetate soluble fraction of the leaves contain valuable antioxidant compounds. Despite being native to Mexico and Central America, M. annua has become naturalized in various regions, including Australia, New Caledonia, Southeastern Asia, India, and tropical Africa. This abstract provides an overview of the geographical distribution, taxonomical classification, morphology, propagation, and pharmacological potentials of M. annua, highlighting its significance in traditional medicine and potential applications in modern therapeutic approaches.

I. INTRODUCTION

Martynia annua, commonly known as the Martynia, Devil's Claw, or Unicorn plant, is a fascinating and unique flowering plant belonging to the Martyniaceae family. Native to tropical regions of Central and South America, this plant has gained popularity for its distinctive physical features and diverse applications. An annual herb known as Distribution In India Kakanasika in Ayurveda, Martynia annua is used in traditional Indian medicines to treat epilepsy, inflammation, and tuberculosis. The plant was given the name Martynia in honor of John Martyn, a botany professor at Cambridge University. A number of therapeutic uses, including analgesic, anti-inflammatory, wound healing, antifertility, and antioxidant, have been made use of by M. annua Linn's many parts, including its seeds, roots, stems, leaves, and flowers. According to reports, it has shown that it may have pharmacological capabilities, such as anti-inflammatory, antibacterial, and anti-convulsant actions. M. annua is usually discovered in wastelands, dry and wet woodland zones, and by the side of the road. It is a weedy uncommon plant that is native to tropical and subtropical regions of Mexico, Burma, and Central America.

Vernacular name : Baghnakhi, Bichu, Mathajori (Hindi); Thaelkodukkukai, Kaakka mooku-chedi (Tamil); Thelu kondi kaya, Garuda mukku, Puligoru-chettu (Telugu); Vinchavi (Marathi); Angora, Baghanaki(Ori); Kakka-chundu, Pulinakham (Malayalam)

Taxonomical Classification
Kingdom: Plantae
Division: Magnoliophyta
Class: Angiosperms
Order: Lamiales
Family: Martyniaceae
Genus: Martynia
Species: Martynia annua

Geographical Distribution

M. annua is native to Mexico, Central America, and the Caribbean. It is presently found naturally occurring in Australia, New Caledonia, South-east Asia, India, and tropical Africa. It has been widely cultivated as an ornamental and medicinal herb.

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Region	Distribution	Origin	Reference
Andhra Pradesh	Present	Introduced	04
Arunachal Pradesh	Present	Introduced	04
Bihar	Present	Introduced	04
Himachal Pradesh	Present	Introduced	04
Jammu and Kashmir	Present	Introduced	04
Karnataka	Present	Introduced	04
Kerala	Present	Introduced	04
Madhya Pradesh	Present	Introduced	04
Maharashtra	Present	Introduced	04
Manipur	Present	Introduced	04
Meghalaya	Present	Introduced	04
Nagaland	Present	Introduced	04
Odisha	Present	Introduced	04
Rajasthan	Present	Introduced	04
Sikkim	Present	Introduced	04
Tamil Nadu	Present	Introduced	04
Tripura	Present	Introduced	04
Uttar Pradesh	Present	Introduced	04
Uttarakhand	Present	Introduced	04

Morphology of Plant

Plant Morphology

Large (15–23 cm), opposing, sinuate lobed, broadly ovate to deltoid, minutely dentate leaves frequently covered with a gelatin dew-like substance.

Foxglove-shaped and odorless flowers with raceme inflorescence are pink and dark purple with yellow blotches on the inside. Corolla glandular and hairy, anterior transversely orbicular-oblong, mouth lobes very oblique and uneven.

Fruits have two recurved, sharp hooks and are firm, bi-lobed, and woody.

Important characteristics for identification: Stout sticky herb, often as an undershrub. Flowers that are hairy and purple-pink with a yellow throat and a dark pink mark on each lobe.

Propagation and Requirements of Plant

Propagation

The tubular, hanging flowers of M. annua have a lateral corolla mouth and produce nectar. Diurnal anthesis occurs. The carpenter bees Xylocopa latipes and X. pubescens, the digger bee Amegilla sp., and the hawkmoth Macroglossom gyrans commonly visit and pollinate flowers in India. With this species, the contact between the stigma's curved lobe and the dehisced anthers promotes spontaneous autogamy.

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Requirements

When there is enough moisture, M. annua seeds can germinate at any time of the year. Within five to six months, seedlings and young plants multiply and bear flowers and fruits.M. annua thrives in open spaces with a pH range of 6.1 to 7.8 and full sunlight to partial shade.

Pharmacological Activities

Antibacterial and Anti-Inflammatory Activity

Plant part used – Leaves,2020

Alkaloids, glycosides, saponins, phenolic acid, tannins, carbohydrates, protein, terpenoids, and flavonoids were all found, according to preliminary phytochemical study.The findings unequivocally show that Martynia annua extracts have strong, dose-dependent antibacterial and anti-inflammatory activity.

Analgestic and antipyretic activity

Plant Part Used – Fruit,2004

Swiss albino mice were used to test the petroleum ether, chloroform, ethanol, and aqueous extracts of M. annua fruits in Bhubaneswar, Orissa, India for their ability to reduce pain. Additionally, the extracts were tested for their ability to treat adult Wistar rats with hyperpyrexia brought on by brewer's yeast. The extracts were given orally at 20 mg/kg for each experiments. Significant analgesic and antipyretic effects were demonstrated by the extracts.

Wound Healing Activity

Plant Part Used -Leaves , 2022

Rats exposed to the extract of Aloe vera, Martynia annua, and calendula officinalis showed considerable wound healing activity, and the results support the formulation's wound healing abilities.

Plant part – Leaves , 2011

M. annua Linn leaves' ethanol extract was divided into three fractions (MAF-A, MAF-B, and MAF-C), each of which was tested for its ability to speed up the healing of wounds on rats using the excision and incision models. All fractions' thin layer chromatography (TLC) profiles were examined, and luteolin underwent TLC as well. For comparison, Povidone-Iodine Ointment was utilized as a benchmark. Rats' dorsal regions received excision and incision wounds for the study. Excision wound models were used to evaluate wound contraction, biochemical parameters (protein level and hydroxyproline level), and histopathology; incision wound models were utilized to assess tensile strength.

Immunomodulatory Potential

Plant Part - Stem Bark , 2020

The total and differential leukocyte count (TLC and DLC), the nitroblue-tetrazolium reduction (NBT) test, the neutrophil adhesion test, the phagocytic response, and the delayed type hypersensitivity (DTH) reaction were among the in vivo models used to assess the immunomodulatory activities of MEMA and MEAC. The animals were immunized using sheep red blood cells (SRBC, 5 109 cells/ml). The dosages of NNRE and NNSE administered were 100 and 300 mg/kg, respectively. Comparing the MEMA and MEAC treated groups to the control, the TLC and lymphocyte count increased noticeably, however the neutrophil count declined. The extracts were found to potentiate the DTH reaction brought on by SRBC in a dose-dependent manner.

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Antioxidant Potency of Its Stem and Leaves in Comparison

Plant part – Stem and Leaves , 2012

The objective of the current study was to compare the in vitro antioxidant and radical-scavenging abilities of different fractions of Martynia annua L. stem and leaves. Using the Soxhlet device, the antioxidant components were first extracted in methanol separately from the stem and leaves. These methanolic extracts of the stem and leaves were fractionated separately in different

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polarity solvents. Utilizing various antioxidant assays, including ferric reducing antioxidant power (FRAP), 2,2'-diphenyl-1-picrylhydrazil (DPPH) scavenging, total phenolic contents (TPC), and total antioxidant activity by phosphomolybdenum complex method, the comparative antioxidant potential and radical scavenging activities of these fractions were examined. According to the findings, when compared to other fractions under study, the stem's n-butanol-soluble fraction exhibited the highest percentage of DPPH scavenging (83.62 0.38% at a concentration of 250 g/mL). The leaf fraction that is soluble in ethyl acetate likewise showed good activity (82.88 0.34%), almost on par with it. However, the total antioxidant activity (0.187 0.85), total phenolic content (278.32 0.73 mg/GAE), and FRAP value (149.00 0.56 mg/TE) were all highest in the n-butanol soluble fraction of the stem. Thus, it was determined that the stem's soluble in n-butanol fraction includes a large number of antioxidant chemicals. The soluble portion of leaves that may be dissolved in ethyl acetate is another excellent source of antioxidants.

II. CONCLUSION

In conclusion, Martynia annua, the fascinating and unique flowering plant native to tropical regions of Central and South America, holds great promise for its pharmacological potentials and diverse applications in traditional medicine. Its various parts have been utilized for therapeutic purposes, such as treating epilepsy, inflammation, and tuberculosis. The plant exhibits significant pharmacological activities, including antibacterial, anti-inflammatory, analgesic, antipyretic, wound healing, and immunomodulatory effects.

The widespread geographical distribution of M. annua, ranging from its native regions to other parts of the world, indicates its adaptability and potential as a valuable medicinal plant. Its successful naturalization in diverse regions underscores its resilience and potential as an important herbal resource.

The taxonomical classification of Martynia annua places it within the Martyniaceae family, further reinforcing its unique botanical characteristics and distinguishing features.

Studies exploring the stem and leaves of M. annua have revealed valuable antioxidant compounds, making it a potential candidate for antioxidant-based therapies.

As modern scientific research continues to investigate the diverse pharmacological properties of M. annua, there is a growing interest in harnessing its potential for novel drug development and complementary medicine. However, further research is warranted to unlock the plant's full pharmacological profile, identify active compounds, and understand their mechanisms of action.

In conclusion, Martynia annua represents an intriguing and promising botanical resource with a rich history in traditional medicine and potential applications in modern therapeutic approaches. Continued research and exploration of this plant's pharmacological properties may lead to the development of new medicines and treatment strategies, benefiting human health and well-being.

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