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MORPHOLOGY, ANATOMY, ETHNO BOTANICAL STUDIES OF CLIMBING FERN: *LYGODIUM FLEXUOSUM* (L.) SW. A REVIEW

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ABSTRACT

Nature has provided a remedy to cure all ailments of mankind. The Indian subcontinent is one of the most interesting phytogeographical regions of the world, as it displays a large variety of habitats and climatic zones with different geological history. India is rich in plant wealth and facilitates better systematic. *Lygodium* is an abundant genus comprising of 10 species. The necessity of herbal medicine is being increasing day by day due to their safety and usefulness. The ferns are found to be abundant in the Himalayas and Western Ghats, which are the two hotspots of biodiversity in India. Being a group of lower plants, they were always uncared for and their important aspect has been ignored. Very less attention has been given towards the utility of Ferns though they possess economic importance and medicinal value. Different parts like rhizome, stem, fronds, pinnae and spores are useful in the treatment of various diseases. Herbs are playing a key role in increasing the economy of the country and had taken the Nation on to the new alleyway to achieve the goal of development. In very dry or exposed places, the veins and lamina of *Lygodium flexuosum* are often rather copiously hairy. *Lygodium flexuosum* is very common at lower altitudes 300 and 900 m and sometimes covering adjacent small bushes, climber in Sikkim & Darjeeling forests ascending up to 1500 m altitude. It belongs to the family Lygodiaceae (Schizaceae) and widely used in treating various ailments like jaundice, wound healing and eczema. This review considers the bioactivity basis of this medicinal plants and this may help for further detailed investigations. This article reviews the complete details of the Morphology, Anatomy, Distribution and Ethno botanical activities.

KEYWORD: *Lygodium flexuosum*, Diversity, Herbal Medicine, Pteridophytes, Darjeeling, India.

INTRODUCTION

The genus *Lygodium* was in the past treated as belonging to family Schizaeaceae, along with *Anemia*, *Schizaea* and *Mohria*. Bierhorst (1991) recommended the recognition of families:Schizaeaceae (*Actinostachys*, *Schizaea*), Anemiaceae (*Anemia*, *Mohria*) and Lygodiaceae (*Lygodium*). This separation is based on morphological and cytological evidence. The genus *Lygodium*is represented by 10 species; six species in 2 from South India and in Uttar Pradesh so far the only species is reported. *Lygodiumflexuosum* is reported to be present in many localities in India like Dehra Dun: Robber's cave. Rajpur, Mussoorie near Mossy falls, ChamoliGarhwal: Augustmuni forest, Guptakashi, Kalimath, Ookhimath, Mastura, Nagpur block near Gaduna, Nanital: Dogaon, Tanakpur, Bhaber forest, Almora: Jageshwar, Pithoragarh: Lohaghat, Pithauragarh, Thal, Thalkedar, Garon, Darjeeling hills Meghalaya, Khasi & Jaintia hills, South and Central India. The primitive man must have used plants as therapeutically actives agents for curing various diseases. Nature has provided a complete remedy to cure all ailments of mankind. Mostly grows at lower altitudes of 300 to900 m and sometimes covering adjacent small bushes, climber in Sikkim & Darjeeling forests lower to 1500 m altitude. The history of herbal medicines is old as human civilization. India has an ancient heritage of traditional medicine; Materia Medica of India provides more information on this folk and traditional medicine.

Lygodium flexuosum (Linn.)

The specimens were collected using conventional methods and techniques. The plants were collected from the Darjeeling; West Bengal, India voucher number is DJ 129all the specimens are deposited at the Department of Biotechnology, DDU Gorakhpur University, Gorakhpur. Collection of plant material for the herbarium should be done with utmost care. Identification and authentication was done by C.R. Fraser Jenkins (Royal Botanic Garden, Edinburgh) Standard procedure was used to get extraction from leaves of the collected plant as follows. Fresh leaves were collected and washed thoroughly by tap water followed by sterile distilled water. Leaves were chopped and shade dried. The dried samples were grounded to coarse powder and stored in a container at room temperature. The samples were dissolved in methanol and distilled water and used for the analysis.

Taxonomic Analysis

Short creeping rhizome thick 0.4 cm covered by tubular hairs (Plate I, Fig: 1 b, c & Plate II, Fig: 6). Stripes arranged closely, about 47cm long, 3mm thick, dark brown stramineous and glabrous above, abaxially rounded, adaxially flattened; fronds oblong- lanceolate; about 700 cm wide, tripinnate; primary pinnae alternate, (Plate I, 1 a,) about12cm apart with about 3 mm long common stalk forked once and bearing a dormant bud on the forking axis; each forked branch bears two to three pairs simple or forked pinnules alternately, pinnules about 9 x 2 cm oblong lanceolate, simple or forked or auriculatedonone or both the bases, apex subacute or acute or acuminate, base cuneate in simple pinnules; margin regularly or irregularly serrulate in sterile pinnules; costa raised above and below; veins distinct above and below, forked thrice or twice, free, reaching the margin; pinnule pale green; texture herbaceous (Plate II Fig: 11).

Common name

Maidenhair creeper; ribu-ribubesar, ribu-ribu-gajah, daraipaya, and akarsidin (Malaysia); bogen-kletterfarn (German).

Sori and spore

Sporangia arranged adaxially on about 3 x 1.5 mm long, finger like spikes along the margin of the pinnules; (Plate I Fig: 1 d, e) sporangia about five pairs, alternate; Each sporangium protected by a separate thin indusium attached along the vein and opening forward; spore trilete, tetra hederal, arms of laesura almost to the periphery, exine thick, deep brown, (Plate II Fig: 11) sparsely bears verrucae intermixed with granules spores about43 µm in diameter; yellowish green. Sporangia oblong ovoid with short lateral stalk, born singly along the leaf margin in two rows(Plate II Fig: 9, 10).

Plate I

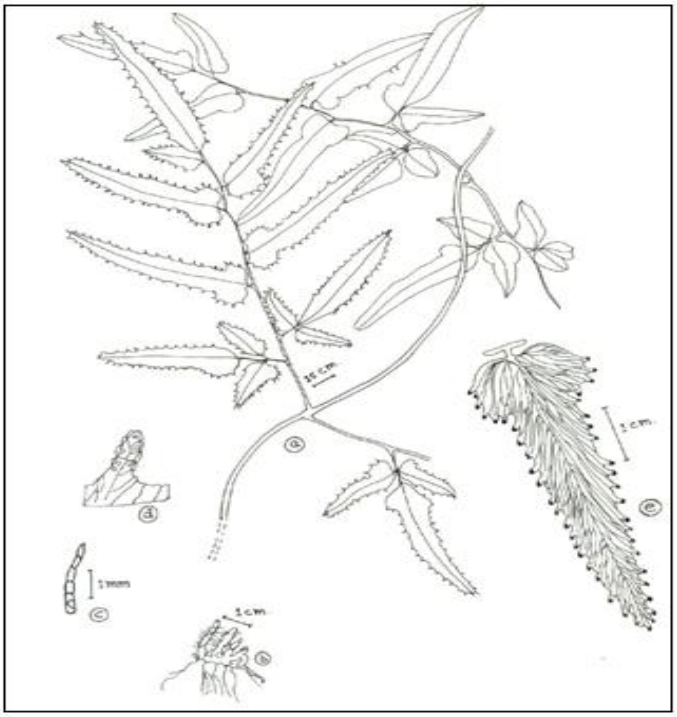

Fig. 1a: Habit, b. Rhizome, c. Rhizome hairs, d. Sorus enlarged showing abaxial side; e. Pinna enlarged showing venation and Sori

Plate II

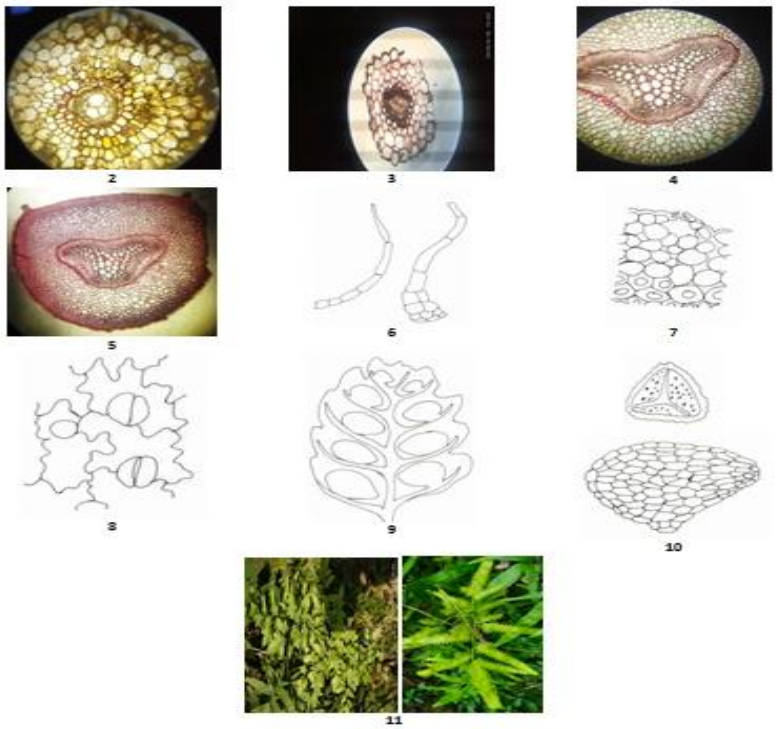

Fig 2: T.S. of Rhizome 45x 3: T.S. Rhizome 4: Cellular part showing Triangular shaped Xylem45x 5: T.S.

Petiole 6: Scale 7: Cellular part of Petiole8: Stomata 9: Fertile Part 10: Sporangia & Spore 11: Habit

Anatomy

Epidermal cells of rhizome thickly cutinized, ground tissues thick walled contains starch grains, vascular cylinder protostelic with well defined endodermis and pericycle, meta xylem consists of scalar formtracheids having oval, elongated pits on their walls, proto xylem elements spiral, double helices extending in opposites direction; stomata polycyclic, restricted to abaxial surface, young lamina bear acicular hairs on both the surfaces; petiole long bearing two lateral aerophores, (Plate II Fig: 7) epidermal cells thin walled but hypodermal cells sclerotic, aerophores guarded by stomata (Plate II Fig: 8) with cutinized outer edges, petiolar bundle single, xylem tri angular (Plate II Fig: 4,5) in cross section, phloem encloses the xylem, proto xylem elements lies at the four corners.

Medicinal properties

It is an important medicinal plant as some of the scholars of Indian System of medicine reported that the plant may be "RudraJata" an intermediate drug in classical text of Ayurveda and its medicinal values have been reported from all the parts of the plant. The root is used in jaundice and stomach pain by Rabha, Oraon and Mech tribes in Jalpaiguri district of West Bengal, India. In China it is used as an expectorant. It is a palatable species and used in the manufacturing of basket, hats, bags, and other fancy items. One teaspoonful of leaf powder is mixed in milk and given orally for children to improve memory. Leaf paste is applied on boils. Rachis of the plant is tied over forehead to reduce headache by the Reang tribe. The plants are used as expectorant; rhizomes boiled with mustard oil and locally applied on carbuncles and in rheumatism, sprains, scabies, ulcers, eczema and cuts. The aqueous extract of the rhizome is used to cure gonorrhea. The paste of the rhizome is applied on piles and the rhizome is also tied on the waist. Rhizome is used as abortifacient and as appetizer; it is also used for treatment of abdominal pain, cholera, indigestion, jaundice, the plant is also used in pleurisy. *Lygodium* is the rich source of alkaloids, flavonoids, saponins and cumarin. The main constituent of the plant is Lygodinolide which is used in wound healing.

CONCLUSION

The history of herbal medicines is old as human civilization. *Lygodium* belongs to the family Lygodiaceae (Schizaceae) and widely used in treating various ailments like jaundice, wound healing and eczema. Literature showed that presence of alkaloids, flavonoids, saponins and

cumarin in *Lygodium flexuosum* and it is one of the most useful herbal medicines in the treatment of diseases. This article reviews the complete details of the Taxonomy (Morphology), Anatomy, Distribution, Ethno botanical activities. This article definitely helps for scholar, scientist and other practitioner such as Ayurveda, Unani, and Homeopathic learner. This information marks importance of the plant in traditional medical system & its pharmaceutical relevance.

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