

Some pteridophytes of medicinal importance from Rajasthan

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Abstract

Pteridophytes (fern and fern allies) by virtue of their possessing great variety and fascinating foliage have drawn the attention and admiration of horticulturists and plant lovers for centuries. They are represented by about 305 genera, comprising more than 10,000 species all over the world. About 191 genera and more than 1000 species are reported from India. Medicinal value of pteridophytes is known to man for more than 2000 years. In the present article an attempt has been made to compile the pharmacological, clinical and medicinal uses of some common pteridophytes available in Rajasthan. This group of plants has least been exploited for the medicinal purpose, hence, this article may be useful for further exploration of ferns and fern allies found in this area.

Keywords: Pteridophytes, Medicinal plants, Pharmacological use.

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centuries. They are represented by about 305 genera, comprising more than 10,000 species all over the world. About 191 genera and more than 1000 species are reported from India⁴.

Medicinal value of pteridophytes is known to man for more than 2000 years. Theophrastus (327-287 B.C.) and Dioscorides (100 A.D.) have referred to medicinal attributes of certain ferns. Sushruta and Charaka (100 A.D.) mentioned medicinal uses of *Marsilea minuta* Linn. and *Adiantum capillus-veneris* Linn. in their Samhitas^{5,6}.

Though recent ethnobotanical, phytochemical and pharmacological studies have reported the medicinal and pharmaceutical values of many species of pteridophytes, still some species of pteridophytes, used by the tribals are yet to be evaluated for their pharmaceutical value and to isolate the active principle⁷⁻¹⁰.

In the present article an attempt has been made to compile the information on various medicinal uses of sixteen commonly available pteridophytes of Rajasthan.

***Adiantum capillus-veneris* Linn.**
(Adiantaceae)

These plants are found in sandy alluvial soil deposited in rock-crevices near

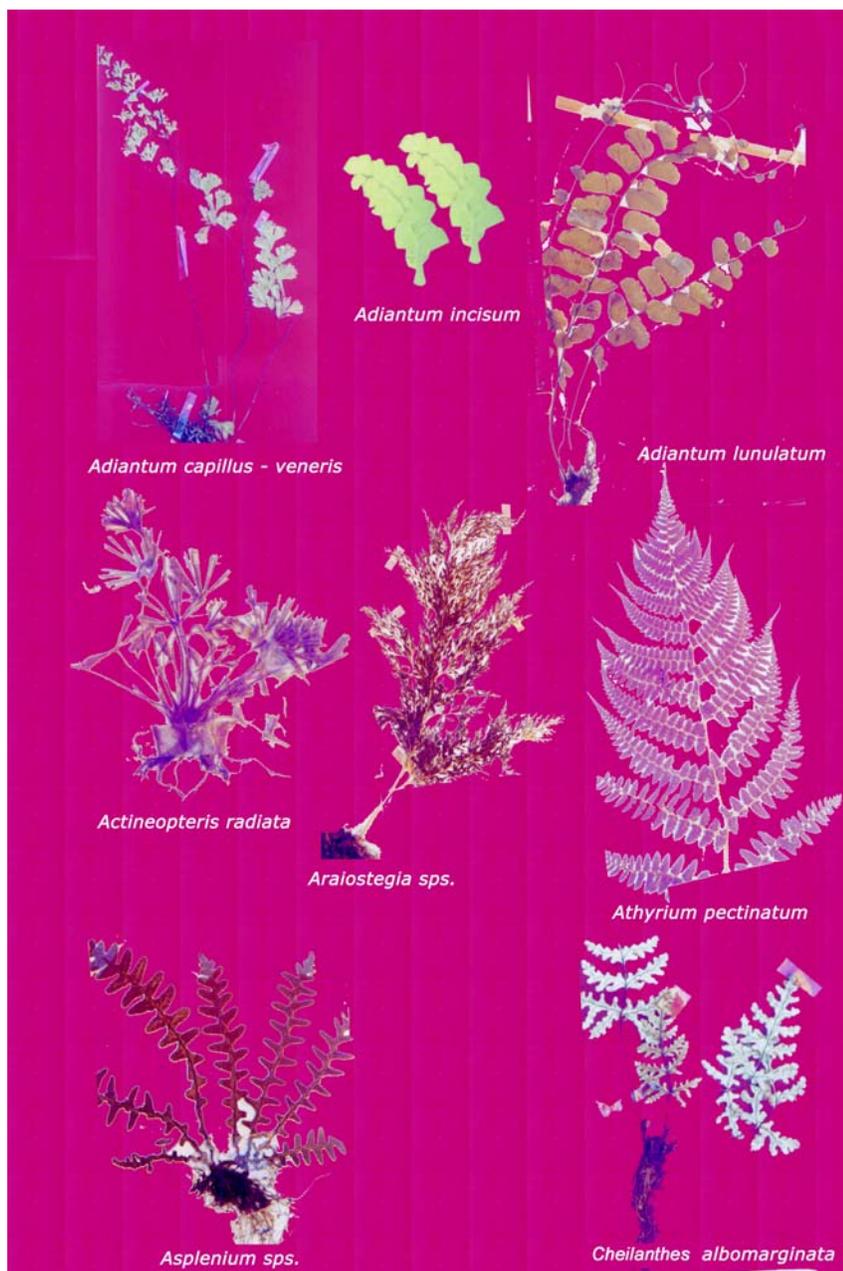
Introduction

The knowledge about the use of medicinal plants has been accrued through centuries and such plants are still valued even today, although synthetics, antibiotics, etc. have attained greater prominence in modern medicine. It is, however, a fact that these synthetics and antibiotics although they often show miraculous and often instantaneous results, prove harmful in the long run and that is why many synthetics and antibiotics have now gone out of use or suggested to be used under medical supervision. In the case of most medicinal plants, however, no such cumulative derogatory effect has been recorded and many of the medicines obtained from plants are widely used¹.

The Traditional Indian System of Medicine can be broadly classified into

the empirical forms of folk medicines, which are village-based, region-specific, indigenous herb-based, local resource based, and in many cases, community-specific. The other system called the *Shastriya* stream, which includes the Ayurveda, Siddha and Unani systems of medicine. It is also said to be documented in thousands of regional manuscripts. Presently, the Indian System of Medicine uses over 1,100 medicinal plants and most of them are collected from the wild habitat, of which over five dozen species are said to be in great demand. The tribes of various regions of India are involved in the collection and trades of the herbs^{2,3}.

Pteridophytes (fern and fern allies) by virtue of their possessing great variety and fascinating foliage have drawn the attention and admiration of horticulturists and plants lovers for



Medicinal fern species occurring in Rajasthan

waterfalls or under the moist and shady places on the humus rich soil. Rhizome slender, creeping to sub-erect, 10-30 cm long bearing fronds, roots and narrow lanceolate scales. Fronds are bipinnate, stipe slender, shining black. Sporangia leptosporangiate with tetrahedral, triangular, smooth walled spores¹¹.

The leaves extract is used for fever, cough and bronchial disorders¹². It is also used as a stimulant, purgative, demulcent, emollient, tonic and hair tonic. It has anti-cancerous, hypoglycaemic, aphrodisiac, antifungal, antibacterial and antiviral properties¹³.

***Adiantum incisum* Forsk.**

The rhizome is small and vertical, covered with numerous fibrous roots and scales. Fronds are pinnate 40 to 65 cm in size; each having a bud in its apical region, which serves the purpose of vegetative propagation that is why, this fern, is called as 'Walking fern'. The pinnae are opposite or alternate and the stipe is dark brown. In the fertile frond each pinnae bears a number of marginal separate sori, which are generally long in shape. Large number of sporangia is produced in each sorus.

The plant extract is used in cough, diabetes and skin diseases. In Mt. Abu area the *Bheel* tribe uses the juice of leaves in skin diseases. In Goramghat area the powder of leaves is mixed with butter and is used for controlling the internal burning of the body. The *Garasia* tribe people mix the dry leaves with tobacco and smoke to curb the internal burning of the body^{11, 14}.

***Adiantum lunulatum* Burm. f**

The rhizome is ascending, small, 8 to 22 mm in size, densely covered with fibrous roots, scales and leaf bases. Frond pinnate, 16.5 to 42 cm in length, stipe shining dark brown in colour. The pinnae are more or less lanceolate. In the fertile frond the outer margin of pinnae is smooth bearing an almost continuous sorus (tetraploid plants) or it is broken into 3-5 groups (triploid plants). The sori are linear and protected by the marginal flap or indusium. Each sorus possesses large number of sporangia¹¹.

Ayurvedic Vaidyas describe the plant as pungent, alexiteric and used for

indigestion. The decoction of leaves is useful in dysentery, diseases of the blood, ulcers and erysipelas¹⁵. Sporophylls are used in leprosy and erysipelas^{11, 12}.

The local people in the Aravalli Hills use the decoction of the leaves in cough, asthma and fever¹⁴. The paste of leaves is used in leprosy and erysipelas¹². It is also used to overcome hair falling by putting paste of its leave on head for an hour or so before taking bath for a fortnight.

In Mt. Abu area, *Bheel* uses this plant for urinary diseases and in bleeding from nose. In former the extract of leaves is taken orally and the paste of leaves is applied on the lower portion of stomach, for clear and early release of urine. The leaf extract is put in drops into the nose to stop bleeding, during summer months.

Actiniopteris radiata (Swartz)

Link (Actiniopteridaceae)

The plants are 8-25 cm high, rooting in the crevices of rocks or in between the joints of brick walls in moist and shady places. The rhizome is oblique to horizontal, 1.5 to 2.0 cm in length, densely covered with wiry roots, palaea and leaf bases. The young leaves show circinate vernation but the lamina becomes flat at an early stage of development. The laminae are stiff and rough to touch. The sporangia are sub-marginal on an inter-marginal vein covering almost the entire abaxial surface of segment.

The paste of leaves is used as styptic and anthelmintic^{12, 16}. In Goramghat, Kumbhargarh and Parshuram Mahadev area the ash of the leaves is taken with honey, 2-3 times a day to get relief

from bronchitis. Similarly, the paste of 5-6 leaves mixed with fresh cow milk (nearly 200 ml) is taken for a week or so, to overcome irregularity in menstrual period. The ash (approx. 2-3g) of the plant mixed with fresh cow milk (200 ml) is given to a lady for a fortnight after menses for conception. On the other hand the paste of 8-10 leaves mixed with thin curd (nearly 250 ml) is given for birth control. Decoction of leaves is also used in tuberculosis in the Mt. Abu area by *Bheels*¹⁴.

Araiostegia pseudocystopteris

Copel. (Davalliaceae)

Terrestrial rhizome creeping clothed with brown scales. Stipe glabrous, jointed to the rhizome. Fronds tripinnate, pinnae much dissected into small rhomboidal segments, sori globose to subglobose. Sporangia long stalked, annulus oblique, spores bean-shaped, hyaline.

The tribal people at Mt. Abu area use the decoction of fronds as vermifuge¹⁷.

Asplenium pumilum var.

hymenophylloides Fee

(Aspleniaceae)

Rhizome short, ascending, fronds tufted; stipe not articulate to rhizome. Lamina deltoid, lowest pair largest, textures extremely thin. Sori elongate along veins, sporangia long stalked, annulus incomplete, vertical; spores bilateral¹¹.

It is used as a depurative and sedative as well as it is antibacterial and used in sores and ulcers¹⁷.

Athyrium pectinatum (Wall. ex Mett.) T. Moore (Athuriaceae)

Rhizome creeping and branched; scales brown; stipes fragile, straw coloured, 10-35cm long, lamina variable, broadly lanceolate to sub-deltoid with acuminate apex, decompositely pinnate and finely dissected, pinnae stalked, distantly placed, 6-15 cm × 2-4.5 cm, ascending with slender, glabrous, greenish rachides, pinnules, up to 15 mm × 6 mm, sub-deltoid, cut down into ultimate oblong, narrow segments with dentate margin, sori minute, indusium thin, membranous, spores dark brown.

The plant is common in Mt. Abu area and is frequently used by the *Bheels* for medicinal purpose. The young leaves are used as vegetable. The rhizome is considered as a strong anthelmintic¹⁸.

Cheilanthes albomarginata

Clarke (Sinopteridaceae)

Rhizome short, covered with fibrous roots and ramenta; scales brown, lanceolate; stipe brown/black, slender, erect, 5-10 cm long. Lamina lanceolate-deltoid, 10-25 cm long, at the base, unipinnate with deeply pinnatifid pinnae, hairy and scaly, basal pair of pinnae more developed than the others, scaly, white powdery on ventral surface of lamina, dark green above. Sori marginal, confluent, indusium greenish-brown, margin lacerates; sporangia leptosporangiate, spores with wrinkled/smooth exine.

The plant is used by tribal people (*Bheel, Meena, Garasia, Saharia*, etc.) as a general tonic for children and weak people. The extract of the leaves mixed with honey is taken after meal by the tribal people suffering from tuberculosis^{11, 17}.

Cyclosorus dentatus (Forssk.) Ching
syn. *Thelypteris dentata* (Forssk.) E. St. John; *Christella dentata* (Forssk.) Brownsey & Jermy (Thelypteridaceae)

Rhizome short and creeping; stipe vary variable in length, hairy, scaly at base, scales narrowly lanceolate. Lamina up to 90 cm long, pinnae 15-25 pairs, lower 2-4 pairs gradually reduced up to 4-5 cm long, distantly placed, auricled at macroscopic base, auricle lobed. Largest pinnae 8-10 cm × 1.5-2 cm long, slightly oblique with rounded apex; sori medial, indusia hairy.

The *Bheel* people use young circinate leaves as vegetables at Mt. Abu¹³. The rhizome and sporophyll is used as an antibacterial agent^{11, 13}.

***Dryopteris cochleata* (Don) C. Chr.** (Dryopteridaceae)

Rhizome woody, stout, horizontal or ascending, thickly covered with leaf bases and brown scales. A tufted large fern with generally dimorphic fronds. Barren fronds pinnate or sub-bipinnate and approximately a meter in length; pinnae 12-18 pairs, close, lowest often 30 cm × 8 cm, oblong, lanceolate pinnules lobed or not, denticulate or serrate, and glabrous. Fertile fronds narrowly lanceolate and smaller than vegetative fronds bipinnate with pinnules much contracted thickly covered with sori.

The young leaves are used as vegetable, in eczema and as anthelmintic¹⁹.

***Equisetum ramosissimum* sub sp. *ramosissimum* Maire.** (Equisetaceae)

Rhizome creeping, slender, stem erect, 3.0 cm to 1.2 m in height, simple

and slender or irregularly branched in whorls, vegetative and fertile branches identical. Stem ribbed and jointed. Spikes (cones) oblong, 1.2-2.5 cm long and 1-6 mm in diameter. Large and small specimens appear very different superficially.

The plant extract is administered as cooling medicine for gonorrhoea²⁰.

***Hypodematium crenatum* (Forssk.) Kuhn & Deck** (Hypodematiaceae)

Rhizome creeping, dorsiventral and densely clothed with light brown palae or thin golden yellow scales, pinnules and indusium also setose throughout with white setae. Sori abaxial, reniform, greenish white when young, dark brown on maturation; spores trilete.

The plant is given to ladies for conception; the paste or powder of leaves along with fresh cow milk is taken, after five days of menstrual period for about a week¹⁴. The plant is also used for getting relief from insect bite in Mt. Abu area. The woodcutters apply paste of the frond at the point of injury²¹.

***Isoetes rajasthanensis* Gena & Bhardwaja** (Isoetaceae)

The plants are medium, 5 to 16 cm in length. The rhizomorph is 2-3 lobed; rarely four lobed structure having 6 to 12 leaves per plant. The roots arise in regular sequence from the lower portion of the rhizomorph. Velum covers 1/3 portion of sporangium, microsporangia rare, microspores monolete, megaspores trilete and spinose.

The whole plant extract is used for the treatment of spleen and liver diseases²².

***Marsilea minuta* Linn.** (Marsileaceae)

Plant aquatic/amphibious, rhizome, a runner with distinction of nodes and internodes. From the nodes arise roots, leaves and sporocarps. Leaf with large petiole terminating into four leaflets. Leaflets obovate with smooth or crenate margins; sporocarp stalked, bean shaped rounded.

Plants are used in cough, spastic condition of leg muscles, etc. and also as sedative and for insomnia¹². *Garasia* and *Bheels* cook the leaves as vegetable. The decoction of leaves along with ginger is used to cure cough and bronchitis in many villages of Rajasthan¹¹.

***Ophioglossum nudicaule* Linn.** (Ophioglossaceae)

Plants small, 2.9-6.2 cm tall, rhizomes globose, rarely thick cylindrical giving rise to fibrous roots. Aerial parts with small common stalk, sporophyll ovate or elliptical, lanceolate, apex acute, or obtuse, base cordate, alternate or truncate, texture fleshy. Fertile stalk 2.2-4.2 cm long, spike small 3-14 mm in length.

It is used as a cooling agent and in the treatment of inflammations and wounds. Fronds used as a tonic and styptic as well as in contusions and haemorrhages¹⁷.

***Tectaria coadunata* (J. Smith) C. Chr.** syn. *T. macrodonta* (Fee) Chr. (Aspidiaceae)

Rhizome large ascending or horizontal covered with roots, scales and leaves. The fronds are large and often

0.5-1.0 m long, pinnatifid or distinctly pinnate below with the pinnae deeply pinnatifid, rarely bipinnate or more compound. Rachis surface glabrous, stipes tufted, chestnut brown with scaly base. Sori large in two rows between the main veins, on the netted veins or at the apex of free veinlets with a reniform or usually peltate indusium. Sporangia typical leptosporangiate with vertical annulus, 48-64 monolet spores are produced per sporangium.

The plant occurs frequently at Mt. Abu so the *Bheel* use it frequently as medicinal plant. The leaves mixed with honey or decoction of leaves is given to asthma and bronchitis patients. Woodcutters use the paste of leaves on the place of irritation caused by stings of honeybee, centipeds, etc¹⁴.

Conclusion

It is concluded that ethnomedicinal importance of these plants and their active constituents would be helpful in treating various kinds of diseases. Crude extracts and their interactions with different active fractions of the plants are needed to explore the exact mechanism of the interaction among the active phyto-constituents. Similarly, the efficacy of crude extracts or polyherbal preparations needs to be studied *in vitro* to assess their therapeutic utility.

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