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A Review on the Potential Uses of Ferns

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Introduction

Man has been using plants as a source of food, medicines and many other necessities of life since ancient times. Even to this day the primitive tribal societies that exist depend on the plant life in their surroundings. Though there were investigations of the edible economic values of the higher plants, especially the pteridophytes and angiosperms have been unfortunately ignored. The pteridophytes are used in Homoeopathic, Ayurvedic, Tribal and Unani medicines and provides food, insecticides and ornamentations.

Ferns used as food

With very few exception ferns have not been widely used as a source of food. The fern stems, rhizomes, leaves, young fronds and shoots and some whole plants are used for food. Tree ferns have often been used as food and starch in Hawaii. Also, ferns are supposed to increase milk production when fed to cows in Sicily. The young fronds and underground stem of the fern *Asplenium ensiforme* are used for food by hilly tribes. In Malaysia, *Blechnum orientalis* L., rhizome is eaten and whole plant is used as feed and as poultice in boil. The fronds of *Ceratopteris thalictroides* are used as a vegetable. The young fronds of *Diplazium esculentum* are eaten either as salad or as vegetable after cooking. The rhizome and young shoots of fern *Nephrolepis biserrata* are eaten as vegetable. The fern *Ophioglossum reticulatum* also eaten as salad and as a vegetable. In India, fern stems of *Angiopteris* sp. is eaten for starch. In China, rhizome of *Pteris* sp. is eaten as a kind of arrow root. The young fronds of *Pteris ensiformis* and young leaves of *Helminthostachys zeylanica* are steamed and eaten in Phillippines. *Phymatosorus longissimus* and *Microsorum alternifolium* fern fronds is also used for food. *Marsilea drummondii* A.Br. the starchy paste of the sporocarps of this species is made into cakes called "nardoo" and is eaten by the natives of Australia.

Ferns used as medicine

The pteridophytes constitute the primitive vascular plant group which are found scattered all over the

world. Although, not much consideration has been given towards the utility of pteridophytes yet these possess equal economic importance including medicinal ones. Caius (1935) is supposed to be the first man who has described medicinal uses of some ferns of India. The medicinal values of ferns are summarized in the following table:

Table 1. The medicinal values of Pteridophytes.

Sl. No	Botanical Name	Uses Part	Medicinal Use
1.	*Actinopteris radiata* L.,	Whole plant	Anthelmintic and stypic
2.	*Acrostichum aureum* L.,	Rhizome	Heal wounds and boils
3.	*Adiantum aethiopium* L.,	Whole plant	Emollient in cough and diseases of chest
		Leaf	Colds
		Rhizome	Promote parturition
4.	*Adiantum capillus - veneris* L.,	Leaves	Cough, throat affections
5.	*Adiantum caudatum* L.,	Leaves	Cough, fever and skin diseases
		Juice	Cure diabetes
6.	*Adiantum pedatum* L.,	Whole plant	Chronic catarrhs and other pectoral affections
7.	*Adiantum flabellatum* L.,	Leaf	Cough medicine
8.	*Adiantum phillippense* L.,	Rhizome	Reduce glandular swellings
		Juice of leaves	Dysentery, ulcers, buring sensation *erysipelas* etc.
		Spores	Leprosy and skin disease
9.	*Adiantum venustum* D.	Leaf	Disease of chest, ophthalmia, hydrophobia, tumours, cold and headache
10.	*Asplenium adiantum – nigrum* L.,	Leaves and rhizomes	High cough, inflammations, diseases of the spleen and jaundice
11.	*Asplenium falcatum* Lam.	Whole plant	Treatment of enlarged spleen, calculus, jaundice and malaria
12.	*Aspdenium macrophyllum*	Fronds	Powerful diuretic, treatment of defective urinary secretion
13.	*Asplenium nidus* L.	Whole plant	Depurative and sedative
14.	*Asplenium ruta – muraria* L.,	Whole plant	Cure colds, rickets and also used in swelling
15.	*Asplenium trichomanes* L.,	Whole plant	Colds and abscess of uterus
16.	*Botrychium lunaria* (L.)	Leaves and roots	Dysentry
17.	*Botrychium ternatum* (Thumb.)	Fronds	Dysentry
18.	*Botrychium verginiatum* Sw.,	Roots	Cuts and wounds
19.	*Cephalomanes javanicum* (BI)	Dried fern	Headache
20.	*Ceterach officinarum* Willd.,	Plant	Diuretic and astringent
		rhizome	Used for enlargement of spleen, incontinence of urine, calculus and jaundice
21.	*Cheilanthes farinosa* Kaulf	Root	Cure eczema and stomachache
22.	*Cheilanthes fragrans* (L.F)	Whole plant	Cold and sore throats
23.	*Cheilanthes tenuifolia* (Burm.f.)	Rhizome	General tonic
		Root	Cure wound
24.	*Cibotium barometz* (L.)	Root	Treatment of lumbago
25.	*Drynaria quercifolia* (L.)	Rhizome	Typhoid and hectic fever, dyspepsia, cough and phthisis
26.	*Drymoglossum piloselloides* (L.)	Leaves	Reduce swelling, sprains and for relieving pain

27.	*Equisetum arrense* L.,	Whole plant Ashes of plant	Diuretic Reduce acidity
28.	*Equisetum ramosissimum* Desf. ssp. *Debile*	Whole plant	Cooling medicine for gonorrhoea
29.	*Helminthostachys zeylanica* (L.)	Whole plant	Treatment of sciatica
30.	*Hemionitis arifolia* (Burm)	Fronds juice	Used for burns
31.	*Lemmaphyllum carnosum* (sm)	Fronds	Urinary calculus and rheumatism and stop the haemorrhages
32.	*Lycopodium cernum* L.,	Plant	Used for coughs and used for uneasiness in the chest
33.	*Lycopodium clavatum* L.,	Spores	Used for dyspepsia, hepatic congestion and pustular skin eruptions and act as against rheumatism, cramps and varices
34.	*Lygodium flexuosum* (L.,)	Leaves	Cures rheumatism, sprains, scabies, ulcers, eczema, cuts and wounds
35.	*Lygodium japonium* (Thumb.)	Leaves	Used as an expectorant
36.	*Marginaria macrocapra* (Bory ex Willd)	Leaves	Prevents itches and minor skin diseases
37.	*Mansilea minuta* L.,	Leaves	Used in epilepsy
38.	*Nephrolepis cordifolia* (L.)	Fronds	Reduce cough
39.	*Notholaena eckloniana* kuntze L.,	Leaf	Relieves of cold in the head and chest applied as an ointment in the scalp
40.	*Ophioglossum pendulum* L.,	Fronds	To improve the hair
41.	*Ophioglossum vulgatum* L.,	Whole plant	Possesses antiseptic, detergent, stypic and vulnerary properties
42.	*Osmunda regalis* L.,	Whole plant	Treatment of rickets, rheumatism, intestinal gripping and used as a tonic and styptic
43.	*Pellaea calomelanos* (sw.)	Fronds	Taken for asthma and cold in the head and chest
44.	*Phymatosorus scolopendria* (N.L. Burm)	Young fronds	Used in chronic diarrheoa
45.	*Pityrogramma calomelanos* (L.)	Whole Plant	For kidney troubles
46.	*Pleopeltis lanceolata* (Linn.)	Ferns	Relieves cold and sore throat
47.	*Psilotum nudum* (L.)	Spores	Arrest the diarrhoea
48.	*Pteridium aquilinum* (L.)	Rhizome	Treatment of chronic disorders
49.	*Pteris ensiformis* Burm	Rhizome	Applied to the glandular swelling of the neck
50.	*Pteris multifida*. Poir	Fronds and rhizome	Given in dysentery
51.	*Schizaea dichotoma* (L.)	Rhizome	Relieves cough and throat infection
52.	*Selaginella involvens* (sw)	Whole plant	Reduces high fever
53.	*Selaginella wallichii* (Hook. & Grev.)	Whole plant	Protective medicine after child birth
54.	*Stenochlaena palustris* (Burm.)	Leaves	Cures fever

Ferns for Controlling Insect Pests

Indiscriminate use of synthetic pesticides over the years has resulted in different types of hazards and toxicity. Pesticides residue may constitute a significant source of contamination of air, water, soil and food, which could become a threat to the plant and animal communities. The naturally occurring phytochemicals offer promise to be used as safe alternatives.

Filicin, which isolated from the rhizome of *Dryopteris filixmas,* is a potential insecticide. The filicin has anti-helminthic properties also. The phytoecdysones present mainly in the ferns, still appear to be somewhat relatively free from insect predation. The ferns are effective in arresting embryonic development in insects. These substances may be exclusively produced by plants for defense against insect predation. The extracts of pteridophytes have toxic effects on *Spodoptera littura* and *Helicoverpa armigera*. The young fronds of *Phymatosorus scolopendria* (N.L. Burm.) are spread on the bed to keep off bed bugs.

Ferns Used as Ornamentation

Ferns, the flowerless plants have got great aesthetic value due to their grace and delicate beauty and are cultivated as ornamental plants. As is recorded earlier, by far the maximum of these tropical plants are known are used as ornamentals. The ferns have been successful in acclimatizing and propagating of these species in favourable conditions. The ferns can grow well in such moist and shady places in the gardens where other plants generally cannot grow. The ferns can very well be grown ground or in pots, as epiphytes on tree trunks or in hanging baskets. The ferns are cultivated as ornamentals either indoors in the houses or outdoors in the botanical gardens due to their delicate beauty and grace. Several species of *Lycopodium* Linn. are used in the decoration. Mostly these are used in Christmas Wreaths and are popularly known as “Christmas green”. *Lycopodium volubile*, a beautiful forest species, keeps well after being collected and is generally used for table decoration. Some *Selaginella* species have got feathery moss-like foliage and are greatly admired when grown in pots for table decoration. Many species have various shades of green. Some ferns have metallic and many hued tints particularly uncommon bluish and bronze colours. The leaves of *Selaginella serpens,* which in the morning are bright green in colour and during the day they gradually become paler and in the night they again resume their green colour. The species of *Drynaria* can also be grown as ornamentals in the gardens in ground or as epiphytes. They can also be grown in baskets for indoor decoration which can be kept on stands oras hanging baskets. The *Pteris vittata* Linn. popularly known as “The Brake” is commonly cultivated as a potted plant in the house and in the botanical gardens. *Adiantum* sps also cultivated for decoration purposes. The “Golden fern” *Pityrogramma chrysophylla* and “Rabbits Ear Fern” *Hemionitis arifolia* are cultivated for their splendid beauty and grace. *Ceratopteris* and *Marsilea* ferns can also be used as ornamentals by growing them in pots and keeping them inside the pond. Some *Diplazium* sps. have a gregarious trunk and become tree like in nature and are of great aesthetic value. Some *Dryopteris* and *Asplenium* sps. also cultivated in some botanical gardens due to its grace.

Conservation

The economic values of many ferns and fern allies have been enumerated. By far a large number of them are considered to be highly prized as foliage ornamentals whether indoors or outdoors. It has been pointed out that most of the nursery supplies as also plants for other economic uses are based on collection from wild populations and individuals from forests. In addition the continuous deforestation by the timber merchants and large-scale blasting for road building and tourism development weakens the already fragile slope. Frequent landslides then bring about an ecological disequilibrium which today threatens the fern species. Most fern species, being shade and moisture-loving, grow in the interiors of

forests. Any disturbance of vegetation leads to the destruction of ferns. In certain forests the pteridophytes have been completely eradicated due to the destruction of forests to make way for crop cultivation. Therefore, it is concluded that though exploitation of pteridophytic taxa for their economic value is necessary, steps are desired to be taken for their conservation in botanical gardens in different parts of the country before many of them become endangered or permanently extinct. This is moreover a large percentage of the Indian fern flora is endemic to the country and therefore needs special attention as far as conservation is concerned. Any disturbance inflicted on ferns is sure to affect the biological equilibrium in the forest ecosystem. Apart from conserving ferns *in situ*, certain threatened species should be conserved *ex situ* by cultivating and propagating in gardens and green houses at different altitudinal levels with a view to re-establishing them in the wild. It is also important that field botanists should avoid ruthless collection of rare species and make sure that they leave the bulk of plants to continue to grow and reproduce in the world. "The Conservation on Biological Diversity" signed by the heads of over 150 nations during the UN conference on environment and development held at Rio de Janeiro in June 1992 appreciates the need of this habitat conservation. The major objective of the convention is the conservation of biological diversity and the sustainable use of its components for the benefit of present and future generations.