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Physico-chemical studies of aquatic fern *Marsilea quadrifolia* in Ranchi District, Jharkhand

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Abstract- The present investigation was carried out to study the physico-chemical parameters of the medicinally important aquatic fern *Marsilea quadrifolia*. It is known by Sushnisaag among the tribal of Jharkhand, West Bengal and Bangladesh. Tribal and local people use it as a food for more than 3000 years. Many research studies confirmed that this fern has anti-inflammatory, diuretic, febrifuge, depurative and refrigerant properties.

Key words: *Marsilea quadrifolia*, Fern, Extractive value, Solvents, Moisture Content.

INTRODUCTION

It is an aquatic fern belonging to the family Marsileaceae. It is also known by several names in several other states like Aaraikeerai in Tamil, Caupiya in Hindi, Sunsuniya in Jharkhand and West Bengal, Neerara in Malayalam, European Water clover in English. It is found throughout in India in marshy places and in rivers, canals and ponds¹ and it is widely distributed in temperate and tropical regions of the world. In submerged water it is rooted in the bottom of clayey soil.² In Red Data Book of the International union for conservation of Nature (IUCN)³ *Marsilea quadrifolia* is enlisted. It bears four parted leaf resembling to four leaf clover so it is called as water clover. It has a long-stalked petiole with four clovers like lobes which are either held above the water or are submerged.

MATERIAL & METHODS

Marsilea quadrifolia was collected from the paddy fields of Piska Mode, Ranchi. The identification of this plant was done with the help of flora book "The Botany of

Bihar and Orissa" Vol VI.⁴ The whole plant was washed under running tap water to remove all the soil particles, dust from it, 3- times, then washed it with distilled water also. The plant was shade dried for 21 -24 days or dried it in an oven at 55°C-60°C, until it gets completely dried. Made a coarse powder by grinding it in mortar and pestle. Different solvents were used to made a plant extract.



Fig. 1. *Marsilea quadrifolia*

Physico-chemical parameters:-

- Extractive value
- Moisture content
- Ash value
- Foaming index

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a) Extractive value:- Powdered plant parts were soaked in five different solvents that is in benzene, chloroform, methanol, ethanol, distilled water. Covered all the beakers with Aluminum foil and left it for 24-48 hours. In five different weighed beakers the extract were filtered by using Whatman filter paper. The liquid extract was left to evaporate and after evaporation measured the weight of beakers.

$$\text{Extractive value} = \frac{\text{Extractive weight in solvent}}{\text{weight of drug material}} \times 100$$

b) Moisture content: - Heating the plant powder at 120°C in a hot air oven. The difference between the initial weight and final weight after drying is the moisture content.

$$\text{Moisture content} = \frac{\text{Initial weight of plant powder} - \text{Final weight of plant powder}}{\text{Initial weight of plant powder}} \times 100$$

c) Ash value: - In an earthen pot the plant powder was heated continuously for an hour on heater.

$$\text{Ash value} = \frac{\text{Initial weight of the plant powder} - \text{Final weight}}{\text{Initial weight of the plant powder}} \times 100$$

$$\text{Ash value (\%)} = \frac{\text{weight of Ash}}{\text{weight of leaf}} \times 100$$

d) Foaming index: - In a ratio the decoction of plant material and the water was put in ten test tubes, now shake the test tubes. Measured with scale when the foam appeared.

large value of ash indicates the presence of more inorganic matter. The foaming index was found to be less than 100.

In the present investigation it was found that the moisture content was found to be 9.6% which was greater than the results of Mousumi Das (2021) having moisture content 9.2% and Joy *et al.* (2022)⁵ having moisture content 6.82%.

The total ash content obtained in this present investigation was found to be 7.4% which was smaller than the findings of Mousumi Das (2021) having total ash content 11.53% and Joy *et al.* (2022)⁵ having total ash content 8%.

Parameters	Results
1) Extractive Values	
a. Methanol Soluble Extractive	3.3%
b. Ethanol Soluble Extractive	5.2%
c. Chloroform Soluble Extractive	1.1%
d. Benzene Soluble Extractive	1.1%
e. Distilled Water-Soluble Extractive	5.9%
2) Moisture Content	9.6%
3) Ash Value	7.4%
4) Foaming Index	Less than 100

RESULT & DISCUSSION

a. Extractive value

	Methanol	Ethanol	Chloroform	Benzene	Distilled water
Initial weight	47.458	50.787	49.130	53.487	42.466
Final weight	47.491	50.839	49.141	53.498	42.525
Difference	0.033	0.052	0.011	0.011	0.059
Percentage	3.3	5.2	1.1	1.1	5.9

b. Moisture content

Moisture % = 9.6%

c. Ash value

Ash value of 100gm

7.4%

d. Foaming index

Height of the foam was measured less than 1cm in each test tube. So the foaming index was found to be less than 100.

After performing physico-chemical parameters it was found that distilled water soluble extractive value was found to be 5.9% which signifies that large amount of constituents was soluble in distilled water and less in benzene and chloroform that was 1.1% each. The moisture content was found to be 9.6%. The ash value was found to be 7.4%, a



Extractive value



Moisture content



Total ash content



Foaming index

CONCLUSION

The investigated plant is having many medicinal importance. Regular consumption of this saag relieves in sleep disorders, hypertension and headache. Local people and tribal eat this saag by cooking its petiole and leaves in oil with some salts and masalas. Juices made from leaves is used as a diuretic and febrifuge. It is used to treat snake bite and is applied on abscesses. The plant is diuretic, depurative anti-inflammatory, refrigerant. The plant is also used in eye diseases, cough, bronchitis, diabetes, diarrhoea and skin disease.

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