

Pharmacognostic Evaluation Of *Equisetum arvense* Linn

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ABSTRACT: Pharmacognostical studies were carried out on the sterile stems of *Equisetum arvense* Linn, which showed the presence of xylem vessels, cortex, parenchyma, stomata, and silica granules. Physicochemical parameters such as water, ether and alcohol soluble extractive values were found to be 15.45%, 3.52 % and 4.32 % w/w. The total ash value, acid insoluble ash and water soluble ash were found to be 22 %, 11 % and 8 % w/w respectively. Moisture content and volatile oil content was found to be 15 % and 1.5 % respectively. The loss on drying was found to be 12.5 % w/w. Foaming index calculated was found to be 100. These investigations will be helpful in correct identification and standardization of plant and to differentiate it from the closely resembled species.

Keywords: *Equisetum arvense*, Pharmacognostical studies, Ash value.

INTRODUCTION

The genus *Equisetum* consists are 30 species of rush like, conspicuously jointed, perennial herbs. *Equisetum* is the only living genus of the order Equisetales and the class Sphenopsida. *Equisetum arvense*, commonly known as the Field Horsetail or Common Horsetail, is a bushy perennial herb native to the northern hemisphere. It is a member of a very primitive family of plants. In spring a spore-bearing stem, resembling a thin asparagus shoot, rises 15-20cm; once shed, this is replaced by a pale green bush with erect hollow jointed stems with longitudinal furrows, and with sharply-toothed sheaths covering each joint; from the sheaths of the central stem arise whorls of fine branches, each giving off finer whorls, the whole sometimes extending up to 60cm in height, but usually less.^{[1], [2]} Several studies showed a hypoglycemic^{[3], [4]} and diuretic activity of horsetail.^{[5], [6]} The plant presents a popular use as an anti-inflammatory agent in bathing for skin disease in Europe, Asia and America, as well as antiseptic in Turkey and America.^{[7], [8], [9]} Water and ethanolic extract of *Equisetum arvense* extract possess free radical scavenging activity so it is used as

antioxidant.^[10] The hydroalcoholic extract of the plant proved to have sedative effect.^[11]

However there is very less information is available about the pharmacognostic parameters of this plant and therefore study is designed for pharmacognostical evaluation of field horsetail aiming towards standardization and correct identification of this species and differentiate it from the other species.

MATERIALS AND METHODS

Plant Material:

Equisetum arvense Linn (Field Horsetail) dried sterile stems were brought from Himalaya herb store, Saharanpur, U.P, India. The taxonomic identity of the plant was confirmed by Department of Botanical and Environmental sciences, Guru Nanak Dev University, Amritsar. A voucher specimen no S.R.BotSci/0349 herb has been deposited in department herbarium.

Chemicals and Instruments:

Analytical grades chemicals and solvents were used (Thomas Baker Chemicals Pvt. Ltd, Mumbai). Photomicrographs in different magnifications of all necessary cells and tissues were taken with Pentax

SLR still camera microscopic Unit. Volatile oil is determined with Clevenger apparatus. Ash value is determined using muffle furnace.

Organoleptic evaluation:

The dried plant material is spread on a sheet and organoleptic evaluation is carried out first with naked eye and then magnifying glass and different parameters were recorded.

Physico-chemical parameters:

This part of examination gave the more discrepant image of plant from its adulterated species. The parameters like loss on drying,^[12] ash values (total ash, water soluble ash, acid insoluble ash),^[12] moisture content through azeotropic distillation,^[12] volatile oil content,^[13] foaming index,^[12] water, ethanol and petroleum ether soluble extractive values were determined following the standard techniques.^[12] Each parameter is determined in duplicate.

Phytochemical screening:

Sterile stems of *Equisetum arvense* were dried in shade and coarsely powdered. Seven hundred grams of powdered stems were subjected to successive Soxhlet extraction for not less than 48 hours by solvents in increasing order of polarity viz. petroleum ether (60-80°C), chloroform and Ethanol. Before each extraction the powdered material was dried in hot air-oven below 50° C and again weighed. Finally, marc was digested with distilled water for 24 hours to obtain the aqueous extract. Each extract was concentrated by distilling off the solvent using Heidolph-laborota 4001 and then evaporating to dryness on the water-bath. Extracts were further dried in vacuum desiccator. The successive extracts, as mentioned above, were subjected to various qualitative phytochemical tests for the identification of chemical constituents present in the plant material following the standard procedures.^{[14], [15]}

Microscopical studies:

The micromorphologic characters of sterile stems were identified. In powdered microscopy, the part was treated with chloral hydrate solution mounted with glycerine and observed under pathological microscope. These components were shot and recorded by using Pentax SLR still camera.

RESULTS

Organoleptic evaluation:

Condition: Dried sterile stems

Colour: Dark green

Odour: Slightly sweetish

Taste: Fairly bland

Shape: Slender

Dimensions: Length-10-50cm, Diameter-3-5mm

Fracture: splintery

Other: Joints and longitudinal wrinkles were present

Phytochemical screening:

The results of phytochemical screening are shown in Table 1. This screening revealed the presence of flavonoids, alkaloids, terpenoids, saponins, phyosterols and aminoacids.

Physico-chemical evaluations:

The results of physico-chemical parameters are presented in Table 2.

Microscopical Examination:

Coarsely powdered aerial parts of *Equisetum arvense* shows the presence of bordered pitted xylem vessels (Figure 1). Xylem vessels are complex tissue systems responsible for conduction of water and food material in plants. Cortex is present with 7-8 layers of cells (Figure 2). Living parenchyma is also visible in figure 3. Stomata were clearly visible under the microscope. The stomata were diacytic type (Figure 4). The guard cells nearly hidden by overlying subsidiary cells. The guard cells have silica over its surface which gives *Equisetum arvense* a rough feel and the common name scouring rush. Silica granules are present in all the photomicrographs and distributed diffusely. These are also present over the guard cells surface in stomata (Figure 4).

DISCUSSION

As there is no pharmacognostic / anatomical work on record of this much valued traditional drug, the present work was taken up with a view to lay down standards which could be useful to detect the authenticity of this medicinally useful plant. In other words, the pharmacognostic features examined in the present study may serve as tool for identification of the plant for validation of the raw material and for standardization of its formulations.

Table 1: Results of phytochemical screening

Test	Petroleum ether extract	Chloroform extract	Ethanol extract	Aqueous extract
Alkaloids	—	—	+	+
Carbohydrate	+	+	+	+
Proteins and amino acids	—	—	+	+
Phytosterols	—	+	+	—
Saponins	—	—	+	—
Flavonoids	—	—	+	—
Triterpenoids	—	+	+	—

+ Positive test; — Negative test

Table 2: Physico-chemical parameters of stems of *Equisetum arvense*

Parameter	% w/w (with reference to air dried drug)
Ethanol soluble extractive	4.32
Water soluble extractive	15.45
Ether soluble extractive	3.52
Total ash	22
Acid insoluble ash	11
Water soluble ash	8
Loss on drying	12.5
Moisture content	15
Volatile oil	1.5
Foaming index	100 (height of foam in every tube is less than 1cm)

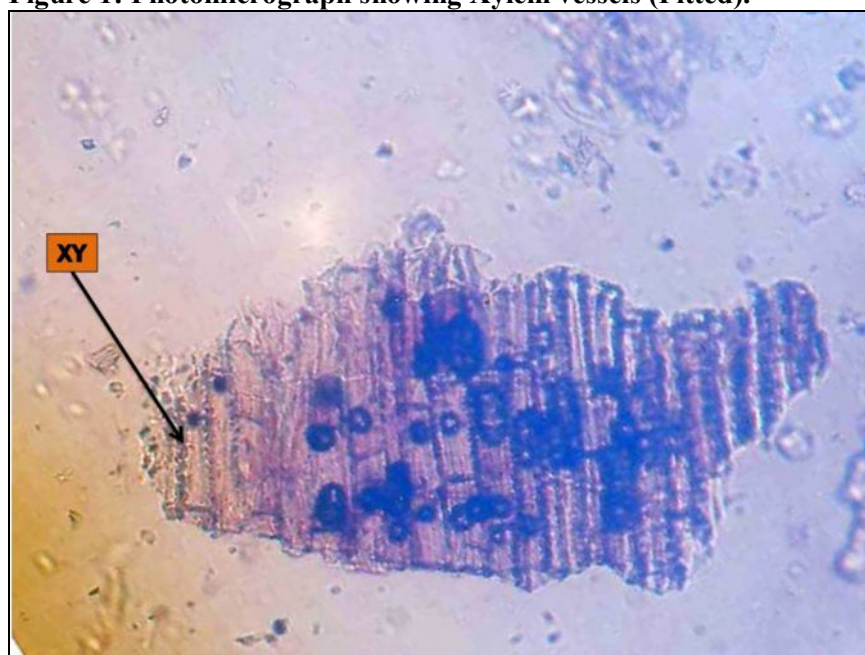
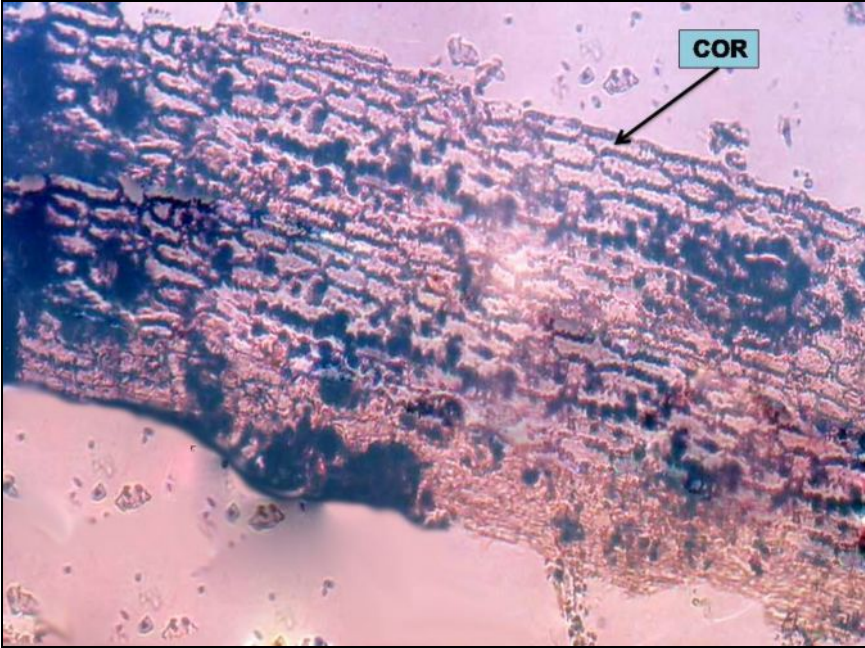
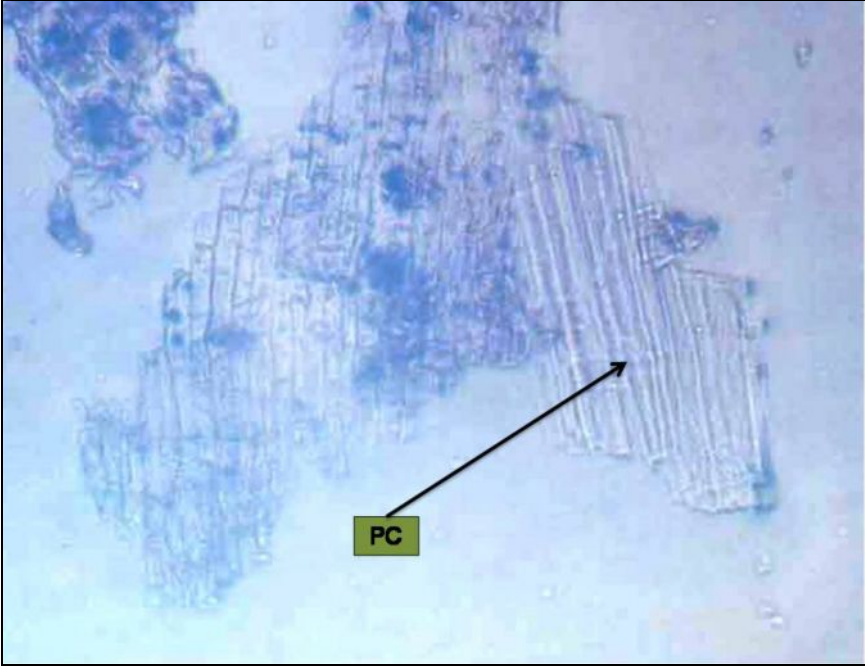
Figure 1: Photomicrograph showing Xylem vessels (Pitted).**XY-Xylem vessels**

Figure 2: Photomicrograph showing Cortex.

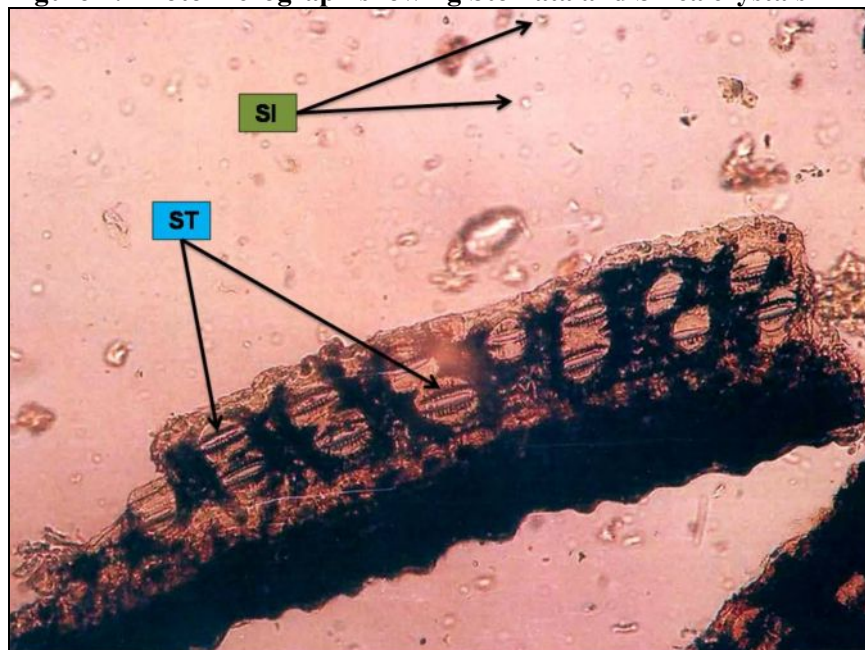


COR-Cortex

Figure 3: Photomicrograph showing Parenchymatous cell wall.



PC-Parenchyma

Figure 4: Photomicrograph showing Stomata and Silica crystals**ST-Stomata; SI- Silica granules****REFERENCES**

1. Clute W.N., The fern allies of North America north of Mexico. Joliet, IL, Willard N. Clute & Co., 1928, 278.
2. Great Plains Flora Association. Flora of the Great Plains. Lawrence, KS, University Press of Kansas, 1986.
3. Iyer H., Formulation for controlling cholesterol, Granted Innovation Pat. (Aust.), 2006, 3.
4. Soleimani S., Azarbaizani F.F., Nejati V., The effect of *Equisetum arvense* L. (Equisetaceae) in histological changes of pancreatic β -cells in streptozotocin induced Diabetic in rats, Pak J Biol Sc, 10, 2007, 4236-4240.
5. Mamedova K.T. and Gysejnova I.D., Effect of *Equisetum arvense* L. on diuresis, Doklady - Akademiya Nauk Azerbaidzhana, 51, 1996, 175-179.
6. Jung H.C., Jang J.H., Ahn D.J., Kim S.J., Yun H.N., Kong W.Y., Herbal beverage with a diuretic effect, Republic Korea, 1999.
7. Hoffman D., The new holistic herbal. Shaftesbury: Element, 1990.
8. Ody P., and Kindersley D., The complete medicinal herbal. New York: DK Publishing, 1993.
9. Mineo S., Takayasu M., Kaori H., Yoshiro T., Taisuke S., Masaaki M., Studies on bathing agent: anti- inflammatory effect of bathing agent which used for skin disease, Shoyakugaku Zasshi, 47 (1), 1993, 1-4.
10. Nagai T., Myoda T., Nagashima T., Antioxidative activities of water extract and ethanol extract from field horsetail (tsukushi) *Equisetum arvense* L, Food chem , 91(3), 2005, 389-394.
11. Santos JGDos jr., Monte FHMDo., Russi M., Lanziotti VMNB., Leal LKAM., Cunha GM., Sedative and anticonvulsant effects of hydroalcoholic extract of *Equisetum arvense*, Fitoterapia, 76(6), 2005, 508-513.
12. WHO Monographs for Selected Medicinal Plants. Volume II. WHO Geneva, 2002, 231 - 245.
13. Khandelwal K.R., Practical Pharmacognosy techniques and experiments (tenth edition). Nirali Prakashan, Pune, 2003, 149-156.
14. Kokate C.K., Practical Pharmacognosy, 1st edn, Vallabh Prakashan, New Delhi, 1986, 15-30.
15. Harborne J.B., Methods of extraction and isolation. in: Phytochemical Methods, Chapman & Hall, London, 1998, 60 -66.
