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PHARMACOGNOSTICAL AND CHEMICAL IDENTIFICATION OF *MORINGA OLEIFERA* LAM. (SAHJANA) SEED- A POTENTIAL NATURAL COAGULANT DRUG

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ABSTRACT

Moringa oleifera one of the miracle tree, is widely cultivated throughout India, belongs to family Moringaceae. The dried seeds of *Moringa oleifera* Lam. are specified source of drug named 'Sahajana'. The quality assurance of Sahajana seeds a traditional herbal drug of global importance used for the treatment of different ailments was studied. It has anti-cancerous, antifungal, antimicrobial, antidiabetic, hepatoprotective, antiasthamatic, antiinflammatory, hypotensive, antifertility, and diuretic properties. It is one of most rich source of vitamin A, vitamin C, milk protein, etc. At global, regional, national and local levels, the end users of this drug face the problem of adulteration. The studies carried out on pharmacognostic, physicochemical, HPTLC fingerprinting reveals specific identities for the particular crude drug which will be useful in standardization of raw drug. This study contributes towards the global recognition and international acceptance of Sahajana as an herbal drug.

KEYWORDS: Pharmacognostic; Physicochemical; HPTLC fingerprinting; Standardization.

INTRODUCTION

Moringa oleifera Lam., commonly known as 'Sahajana' belongs to the family Moringaceae. Many times it is also known as 'Drumstick' or 'Sahjana Horseradish Tree'. It is native to

India and mainly cultivated in Namibia, Angola, Kenya, Ethiopia, Red Sea, Horn of Africa, Pakistan, Bangladesh, Afghanistan, tropical and subtropical region of the world.[1] Although Sahjana is easily cultivable makes it sustainable remedy for malnutrition. In India, it is naturally grown in the northwestern region of the Himalayas**.** It is a very popular drug yielding plant of the India and utilized as a folk medicine in large number of drug formulations in Indian medicine system. This plant is fast-growing, drought resistant in nature and reaches upto 12 m height at maturity.[2,3,4,5] Many researchers suggested that 'Sahajana' is a wonderful tree in plant kingdom because it is not only the rich source of nutrition values but also contains a lot of potential medicinal activities including anti-cancerous, antifungal, anti-inflammatory and diuretic properties.[6,7] Recently, Gopalakrishnan et al. suggested that aqueous infusion of Sahajana seeds are used as natural coagulatant.[1] A large number of reports also suggested that aqueous infusion of Sahajana seeds possesses many bioactivities like anti-inflammatory, antispasmodic and diuretic, also given in venereal diseases.[8] Along with other therapeutic applications, the Ayurvedic Pharmacopoeia of India (API) indicated the use of the dried root bark in goitre, glycosuria and lipid disorders (also dried seeds), and leaf, seed, root bark and stem bark in internal abscess and piles.[9] However, every part of *M. oleifera* is a storehouse of several potential nutrients as well as anti-nutrients. Seeds of Sahajana have excellent coagulant properties and can precipitate organics and mineral particulates out of a solution.[10] The chemical compound of coagulant like aluminum sulfate and ferric sulfate or polymers eliminates suspended particles in waste water by neutralizing the electrical charges of particles in the water to form flocs making particles filterable.[11] The seed of Sahajana is known as natural coagulant because it has cationic protein that can purify turbid water. Thus, this property of Sahajana seeds is attracting much research as an alternative of artificial coagulants. Also, Sahajana seeds are used to extract oil called the Ben oil. This oil is rich in oleic acid, tocopherols and sterols. It can also with stand oxidative rancidity. Many reports suggested that the oil of the Sahajana seed can be used in cooking as a substitute for olive oil, as perfumes and lubrication. The pods can absorb organic pollutants and pesticides.[12,13]

In spite of these, many adulteration / substitution, misidentification, quality inconsistency and controversy pertaining to herbal drugs are challenging the wide acceptability of traditional system of medicine. Now-a-day, several adulterants of Sahajana are available in the market. Sometimes these adulterants are toxic and showed many side effects. Therefore, it is imperative to determine authenticity of crude drugs used for the preparation of medicaments,

because it is associated with the safety of consumers. Conventional methods for genuine drugs via pharmacognostical identification techniques are considered most reliable tools for quality assessment. Given this, in the present different pharmacognostical techniques i.e. macroscopic, microscopic, physic-chemical and HPTLC were utilized for identification of genuine seeds of Sahajana. The present study will surely help to identify authentic plant species in herbal medicine appears to be promising.

MATERIALS METHODS

Herbal drug was resourced from PLIM Campus, Ghaziabad. It was authenticated by the DSRI botanist. The physico-chemical studies of the drug were carried out according API and for HPTLC Profile DESAGA Sample applicator was used and photographs were taken with the help of and DESAGA photo-documentation system.[14]

RESULT AND DISCUSSION

A. Macroscopic characters: Seeds were obtained from the pods of Moringa tree. Fresh Moringa seeds were quite tender, but as soon as they get dried, they became hard and start resembling small beans. Seeds were creamish, trigonous, little hard, winged, 2-3 cm long and 1.0 - 1.2 cm broad. The wings were pepery. Taste slightly bitter, smell mild aromatic (Fig 1; A-C).

B. Microscopic characters: Transverse section shows following characters**;**

The seed coat of Moringa was made up of several layers namely as epidermal layer, exotesta and endotesta. The exotesta's prominent papillate epidermis was followed by one or two layers of subepidermal cells. Cell wall of exotesta was very thick. A layer of stone cells (thick walled) found in testa. The kernel was almost circular in outline, the covering of kernel was composed of many layered polygonal as well as tangentially elongated parenchyma with parquetry arrangement of cells. This layer was followed by thick zone of parenchymatous cotyledonary tissues. The cells of which were more or less isodiametric, thin walled with large intercellular spaces and fully loaded with globular cell contents (Fig 2. A-D).

C. Powder study: Cream coloured, taste slightly bitter, smell mild aromatic. Under microscope it shows following characters- Parenchyma cells with parquetry arrangement, simple and compound type of starch grains, group of pitted type of stone cells with broad lumen, vessels having spiral thickenings (Fig 3. A-E).

D. Physicochemical analysis

Table-1.

1) Foreign matter	Not more than 1%
2) Total Ash	Not more than 15%
3) Acid –insoluble Ash	Not more than 3%
4) Alcohol soluble extractive	Not less than 6%
5) Water soluble extractive	Not less than 7%
6) Hexane extractive	Not less than 22.78%
7) Loss on drying	11.64%

Photographs

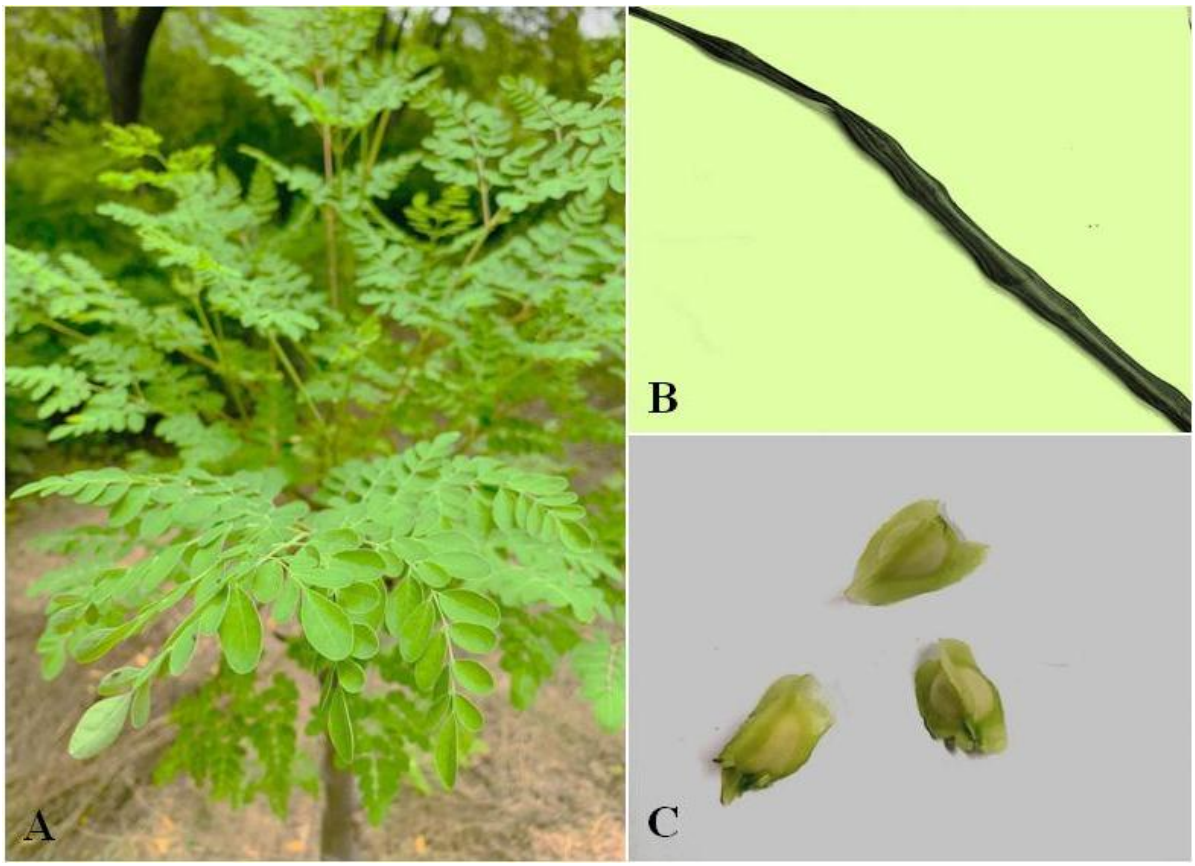

Fig. 1: Macroscopic characters of naturally grown *Moringa olefera* under field condition.

A. 2-year-plant

B. Fruit (Pod)

C. Seed

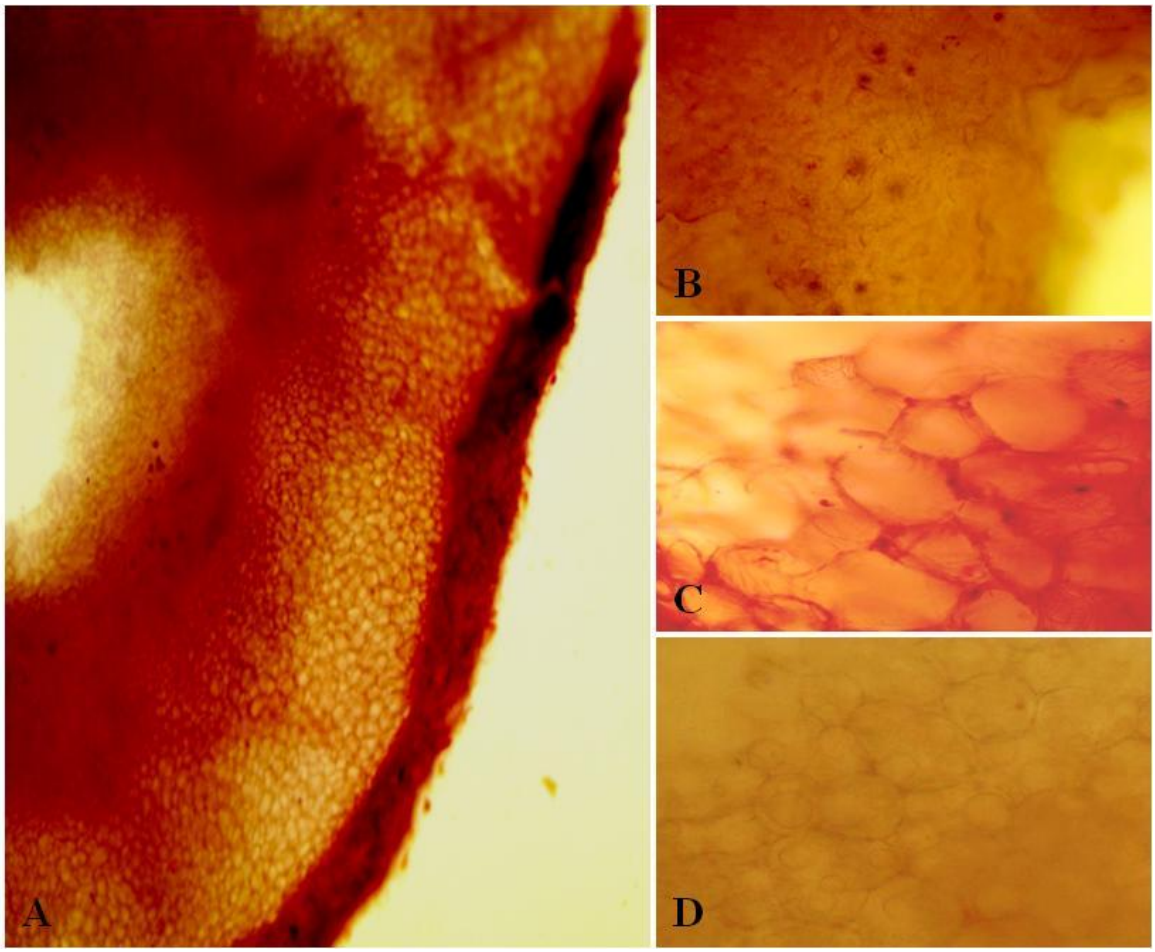

Fig. 2: Microscopic studies on seed anatomy of *Moringa olefera*.

A. T.S. of seed (4x)
B. Layer of stone cells (20x)
C. Parenchyma cells with parquetry arrangement (20x)
D. Parenchyma cells in cotyledons (20x)

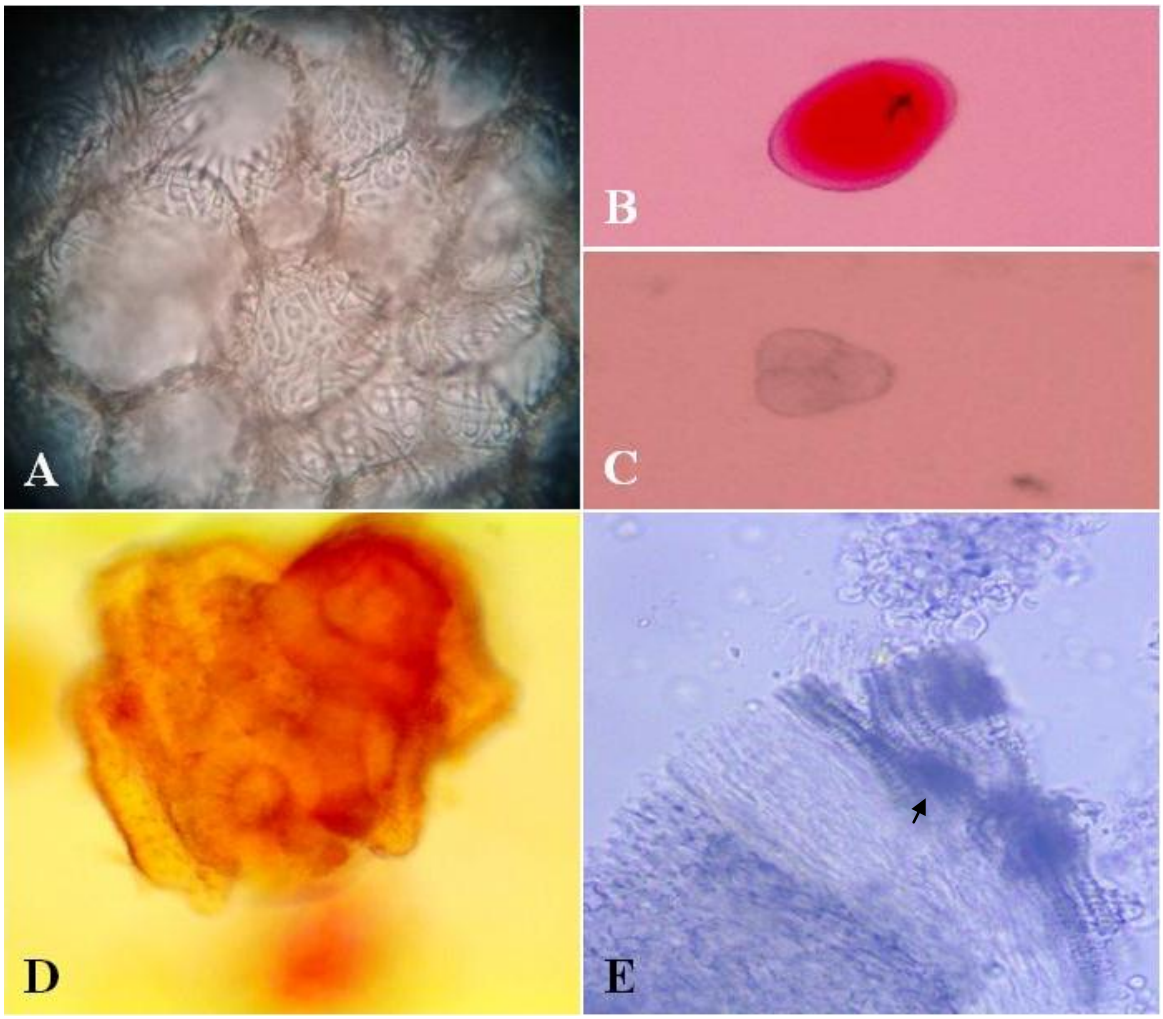

Fig. 3: Powder studies on seed of *Moringa olefera*.

A. Parenchyma cells with parquetry arrangement (40x)
B. Simple starch grain (40x)
C. Compound starch grain (20x)
D. Group of stone cells (40x)
E. Vessel cells with spiral thickenings (10x)

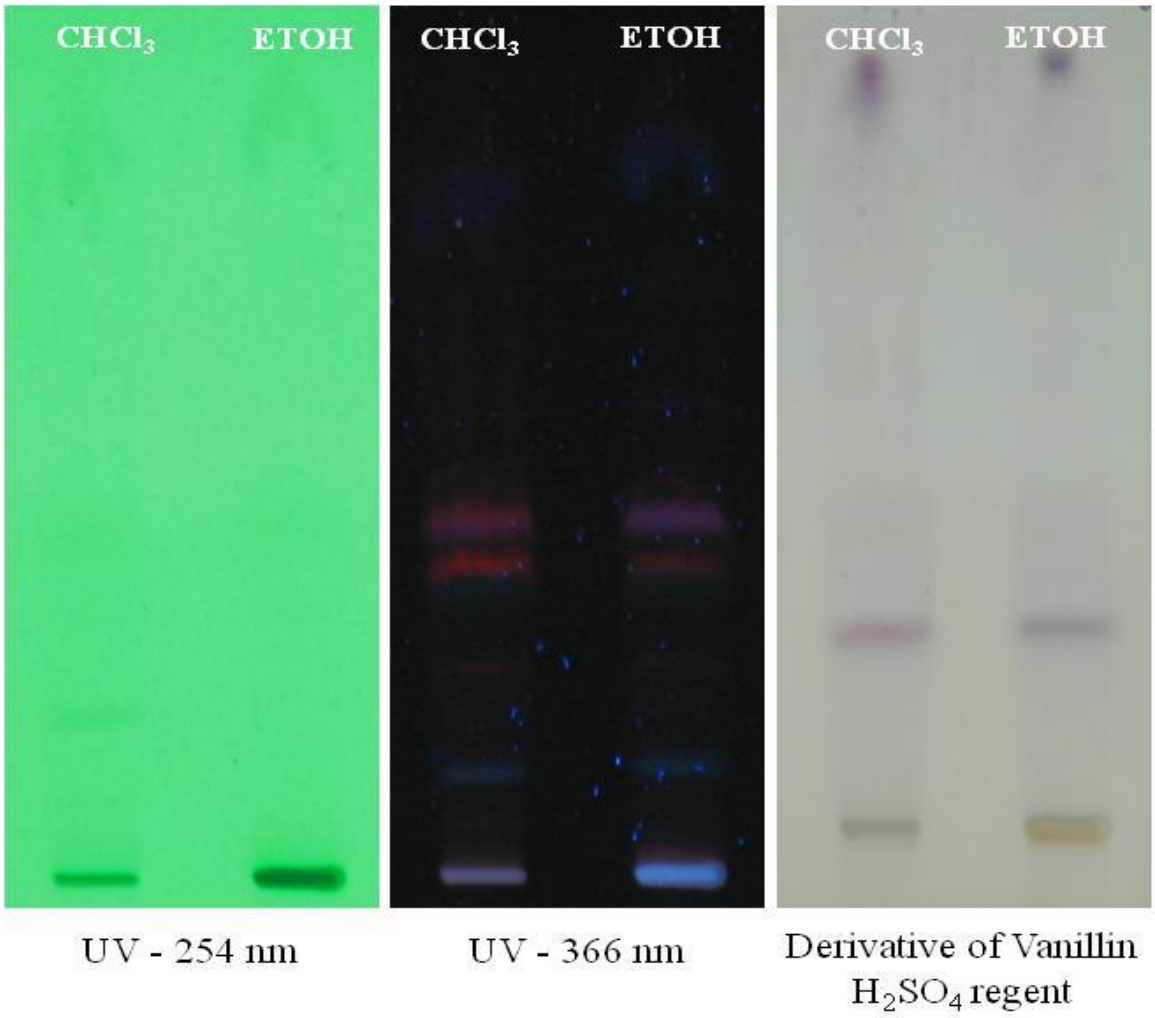

Fig. 4 (A-C): HPTLC fingerprint of ethanolic and chloroform seed extracts of *Moringa olefera* in Toluene: **Ethyl acetate (9**:**1 *v/v*).**

A. 254 nm

B. UV - 366 nm

C. Derivative of 1% Vanillin H_2SO_4 Solution

E. HPTLC: 2g. of coarsely powdered drug was extracted separately with chloroform and ethanol under refluxing conditions on a water bath for about 30 minutes and then filtered through Whatman No.1 filter paper. The extract were concentrated and made upto 10 ml. in a volumetric flask separately. These solutions were used for the HPTLC fingerprinting analysis by DESAGA Sample applicator on aluminium TLC plate precoated with silica gel 60 F_{245} (E. Merk). The plate was developed upto the distance of 8cm. In the TLC development chamber (10x10), using 10 ml of developing system Toluene: Ethyl Acetate (9:1) as mobile phase. The plate was developed on room temperature, observed and scanned under UV 254 nm and UV 366 nm. Further the plate was dipped in 1% vanillin sulphuric acid reagent and heated at

105^0C till coloured spot appeared. The HPTLC chromatogram of chloroform and ethanolic extract of Sahajana seed shows no spots under UV 254 nm but both the extract shows 4 spots under UV 366 nm. After derivetization both the extract shows only one spot (Fig. 4 A-C).[15]

CONCLUSION

Authentication, quality and standardization of this drug were achieved by using macroscopy, microscopy, powder and HPTLC studies. These studies will definitely contribute towards the global recognition and international acceptance of Sahajana (*M. oleifera)* as an herbal drug.

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