

# Seed surface characteristics and preliminary phytochemical analysis of *Moringa oleifera* Lam. seed of family Moringaceae.

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**Abstract**—In folk herbalism the *Moringa oleifera* Lam. is a multipurpose tree. Medicinally it is very important and useful. *Moringa oleifera* Lam. is also known as ‘miracle tree’ or ‘drumstick’. The plant is highly medicinal and nutritional value. It contains highly antioxidant and anti-inflammatory properties. It shows several health benefits also. *Moringa* seeds are edible, oil extracted for cosmetics, biodiesel production, water purification, lubricants, fertilizer etc. The SEM investigation i.e. Scanning electron microscopy play a very important role in differentiating and identification of micromorphological characters of seeds. Seed shows intricate, thick, fibrous reticulation with deep grooves present. Seed coat anatomy clears the internal cellular structure of seed. Seed coat anatomy shows epidermis, subepidermis, exotesta, endotesta and fibrous cells with cotyledon. The morphological and anatomical investigation helps for study of structural features and identification of various taxa. The preliminary phytochemical analysis of *Moringa oleifera* Lam. seed detect the various chemical compositions present in it. The phytochemical like alkaloids, protein, amino acids, terpenoids present in both the extract ethanol and water respectively. Tannins and starch absent in both extracts. Presence of different phytochemicals in seeds are important for preparation of various types of drugs. All the above observations are essential for seed identification and useful in solving taxonomic problems.

**Index Terms**—Seed morphology, Scanning electron microscopy (SEM), Seed anatomy, phytochemical analysis, Moringaceae.

## I. INTRODUCTION



Fig: -01

Fig:-01-Habit- *Moringa oleifera* Lam.tree



Fig: -02

. Fig:-02- *Moringa oleifera* Lamk.white flowers, inflorescence spreading panicle type.



Fig: -03

Fig:-03- *Moringa oleifera* Lamk.green elongated pods



Fig: -04

Fig: -04-*Moringa* dry pods with seeds.



Fig: -05

Fig: -05-*Moringa* seeds shows three whitish papery wings.

*Moringa* is also known as ‘Shigru’ or ‘Drumstick’ or horseradish tree. Occurs in tropical and subtropical parts of India. *Moringa oleifera* Lam. belongs to family Moringaceae. It shows panicle inflorescence. It is highly medicinal plant. Nowadays, India is considered to be leading exporter of the medicinal plants in the world market. Seeds have acquired diversification in both external and internal characteristics so much so that each can be specified independently with definite set of characters. For the identification of seed there are various parameters which are helpful in distinguishing the taxa at suprageneric level. These parameters include morphology, anatomy, information of various types of seeds life, size, shape, color, surface, symmetry, medicinal value of seeds, value of seed in trade and marketing systems. Spermoderm variation through SEM is one of the most important modern identification techniques. The micro morphological characters of seeds were investigated through this special technique. Anatomical features of seedcoat and phytochemical analysis important for seed identification and cellular study. Different plant organs are being used for curing various types of diseases, but seed is one of the important organs which is mostly used for preparation of drugs. (Fig: -01,02,03,04,05)

## II. MATERIALS AND METHODS

Sample collection: - Seeds of family Moringaceae like *Moringa oleifera* Lam. were collected from local places of Amravati district. For seed coat study, all the seeds parameters were studied using dissecting and binocular microscope. Digital weighing balance was used for weighing the seeds in mg. The morphological observations of seeds were done followed by their photography, using 1 cm. scale.

Seed coat morphology (SEM): - To study the seed coat morphology scanning electron microscopy is most important. For this purpose, the individual seeds were dipped in alcohol for 5-10 min. to remove the dust from them. The seed mounted on pin type stubs using double sided adhesive tape or conductive silver paint to prevent charging of the surface during scanning and then coated with a very thin layer of gold in a polaron sputter coating unit. For spermoderm study of seed photomicrograph were taken in the scanning electron

microscope (SEM) (LEO 430) at Birbal Sahani Institute of paleobotany, Lucknow.

Seed coat anatomy: - For the anatomical observation of seed coat study take the transverse sections of seed coat. Using permanent slide preparation method or double staining method place the section on various alcohol grades like 30%, 50%,70%,90% absolute alcohol, xylene, DPX etc. The staining like safranin and light green stain used for staining.

Preliminary phytochemical tests: - The preliminary phytochemical analysis is most important for detection of various chemical constituents. Trease and Evans (1989) test were done. Qualitative phytochemical analysis of the crude powder of the seeds of the plant for the identification of phytochemicals like alkaloids, steroids, glycosides, flavonoids, terpenoids, saponin, protein, tannins, amino acids, starch. Preliminary phytochemical test was done using different extract.

Observations: -

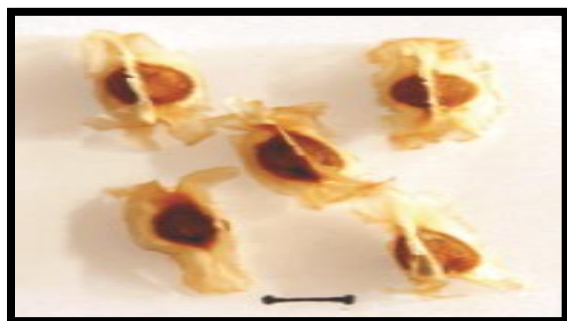


Fig: -06

Fig: -06- *Moringa oleifera* Lam. dry seeds whitish three papery wings,

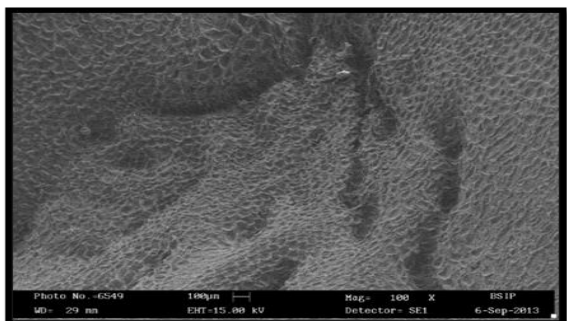


Fig: -07

Fig: -07-x100 Scanning electron microscopy (SEM) of *Moringa* seeds shows intricate fibrous surface variations.

Externally seed 3.88 cm- 1.39cm, 3 angled, brown, 228.10 mg, bilateral, hilum apical, linear, seed surface shows striated, stretch marking, seed shows three lateral edges, edges show long papery wing structure which is whitish in color, wing are attached at one end, another end is free. Seed contain three papery wings. Morphological features and surface characteristics clear by scanning electron microscopy (SEM) (Fig:-06).

The scanning electron microscopy (SEM) of seedcoat shows that the fibrous thick reticulations present near hilar region and on the surface. The deep grooves present on the surface. Intricate, slightly papillae like structure present on it. Scanning electron microscopy gives closer examination of surface structure. Specific magnification of Scanning electron microscopy (SEM) clears surface view and helps for seed identifications (Fig: -07). The micromorphological characters essential and helpful for seed identification. Morphological features help for surface variation of seedcoat.

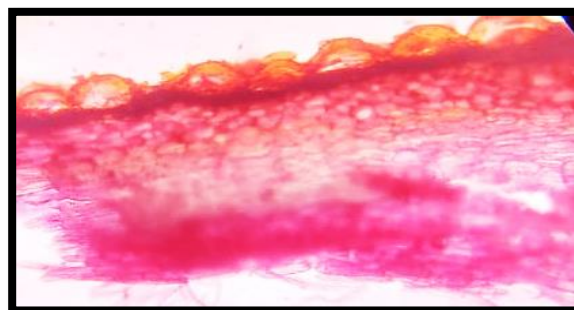


Fig: -08

Fig: - 08- X160 T.S. of seeds of *Moringa oleifera* Lamk. with cellular variations.

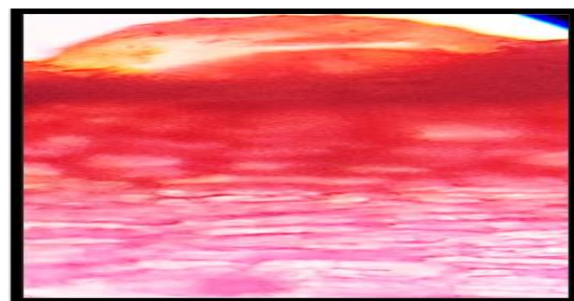


Fig: -09

Fig: - 09- X640 T. S. of seeds of *Moringa oleifera* Lamk. Shows epidermal and subepidermal layers, exotestal, endotesta with fibrous cells, cotyledon region.



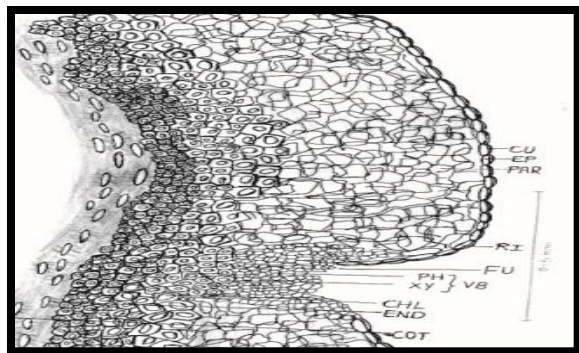


Fig:-10

Fig: -10-X100-T.S. of seedcoat of *Moringa oleifera* Lam. (sketched diagram) shows epidermis, parenchymatous network, exotesta, endotesta, cotyledon region.

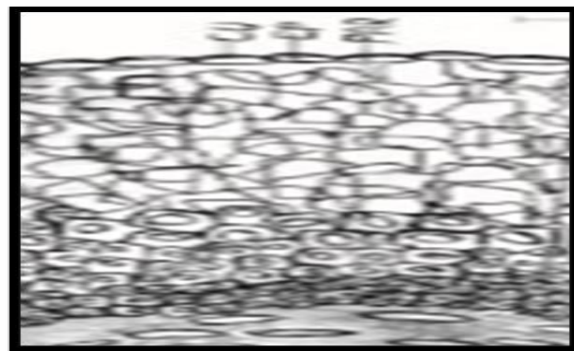


Fig:-11

Fig: -11-X400- T.S. of seedcoat of *Moringa oleifera* Lam. (sketched diagram) with magnified epidermis, parenchyma and cotyledon.

Seed coat anatomy shows upper layer of epidermis which is one layer and subepidermis present below it presence of exotestal layer and outer integument. The parenchymatous cells with intricate network. Presence of endotesta layer which is elongated fibrous cells. Below it presence of inner integuments with cotyledon region. (Fig: - 08,09,10,11)

Observation table: - 01- Preliminary phytochemical observations of dried seeds of *Moringa oleifera* Lam. with ethanol and water extract.

Sr no.	Phytochemical	Plant material (Seed)	
		Ethanol	Water
01	Alkaloids	+	+
02	Flavonoids	+	-
03	Glycosides	-	+
04	Proteins	+	+
05	Tannins	-	-
06	Steroids	+	-
07	Starch	-	-
08	Amino acid	+	+
09	Saponin	+	-
10	Terpenoids	+	+

Present (+), Absent (-)

Medicinally whole seed or seed coat used for preparation of various drugs. Various chemical compositions present inside the seed are effective for drug preparation. Natural products represent rich chemical diversity which is an important source in medicinal field. From the above observation it is seen that the preliminary phytochemical analysis of *Moringa oleifera* Lam. shows that seed powder of

*Moringa* treated with different extracts like ethanol and water it gives different phytochemicals. In ethanol more phytochemicals detected as compared to water. In ethanol detected alkaloids, flavonoids, proteins, steroids, amino acids, saponin, terpenoids. In water extract detects alkaloids, glycosides, proteins, amino acids, terpenoids. The phytochemicals like alkaloids, proteins, amino acids, terpenoids present in both

extracts. Tannins and starch absent in both extracts. (Table: -01)

Medicinal uses: - Its seed oil in combination with equal parts of ground nut oil is applied locally to relieve the pain in rheumatism (Dhiman, 2004). Medicinal use of a seeds were tested in using different formulations in research laboratories, pharmaceutical industries for their scientific, economic and beneficial use. Seeds are also used as water purifier where water purification facilities are not well developed (Singh M.*et al* 2020).

### III. Discussion

Whole plant medicinally very important. In external view size, shape, color, weight, symmetry, hilum position, hilum shape, surface study is an important feature of the seed. Scanning electron microscopy is one of the recent field for furnishing information on seed coat morphology. The morphological variations were well studied during this investigation. The seeds of angiosperms have mostly dry seed coat and complex structure. Seed coat shows variations in structure in relation to the specific features of the ovule such as number, thickness of integuments, vascular tissues and to the developmental changes in the integuments during seed maturation. Seeds are nutrient rich, antioxidant properties. Medicinally whole seed or seed coat used for preparation of various drugs. Various chemical compositions present inside the seed are effective for drug preparation. Phytochemicals from medicinal plants are receiving greater attention in scientific literature, in medicine and in the world economy in general (Bruni 2003). Systematic and scientific investigations of traditional medicinal plants provide important drugs for various therapeutic uses. *Moringa* have nutritional properties rich source of vitamin (A and C), minerals (Ca, P, K, Fe, Cu, S, Mg) etc. It also shows pharmacological properties such as anti-inflammatory, abortifacient, antioxidant, analgesic, antipyretic etc. (Singh M.*et al* 2020). All these studies help for identification of seed taxa, medicinal value of seeds which is important for potential health benefits of the society.

### IV. ACKNOWLEDGEMENT

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