

PHARMACOGNOSTICAL EVALUATION OF KUSHMANDA (*BENINCASA HISPIDA* (THUMB.) CONG) BEEJA

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ABSTRACT:

Background: Kushmanda (*Benincasa hispida* Thumb. Cong.) is a traditionally used drug in the texts of Ayurveda. Seeds of Kushmanda are useful in Taenia. As macroscopic features of seeds of some species of Cucurbitaceae family seems identical, so for identification of Kushmanda beeja and differentiate from other studies, the study was carried out. **Aims and objectives:** Present study was aimed to record Macroscopic, microscopic and Powder microscopy of seed of *Benincasa hispida* **Methods:** Authenticated, matured, seeds were collected and macroscopic, microscopic characters were documented. **Results:** Pharmacognostic study of seed showed different cells of testa, perisperm, endosperm, embryo and cotyledon. **Conclusion:** The results obtained will prove as standard reference for identification and distinguish it from any admixture.

Key Words: *Kushmanda, Benincasa hispida*, pharmacognostic

INTRODUCTION:

Kushmand (*Benincasa hispida* thumb. Cong.) is a large climbing or trailing herb with stout, angular, hispid stems, cultivated as a vegetable throughout India up to an altitude of 1200 m. Leaves large and long-petioled, 5-7 lobed, reniform-rotund, deeply cordate, upper surface sparsely pilose and scabrous, lower rigidly hispid, margin sinuate, dentate or crenulate; tendril slender, short; flowers solitary, axillary, large, yellow, monoecious. Male flowers are large, solitary, petals 5, nearly free; stamens 3, inserted near the mouth of the tube; anthers free, inserted, subtrifoliate. Female flowers are also large solitary, petals 5, nearly free, spreading obtuse, mucronate, 3-5 cm long. Filaments, hispid, 2-3 mm. long; ovary ovoid or cylindrical, soft, hairy, style 2-3 mm long, Calyx tube densely vellose, 12-15 cm. broad, lobes lanceolate, 8-12 x 3-5 mm. Fruits are fleshy, succulent, 25-60 cm long and 10-25 cm broad, densely hairy when young, thickly deposited with white easily removable waxy bloom when mature, flesh white, spongy; seeds white, yellowish white or pale brown, ovoid, compressed, distinctly marginate^[1].

In Vedic literature very few references were available regarding Kushmanda. Kushmanda was used instead of animal in *yajna* for sacrifice^[2]. In Samhita Kala all the Acharyas described Kushmand in different context. It has been attributed more than twenty five synonyms like Pushpaphala, Pitapushpa, Brihatphala etc. in Ayurveda classics^[3]. The plant is indicated as memory enhancer, tranquilizer, laxative, purgative, helmenthicide, coagulative, cardiac stimulant, diuretic, spermatogenic etc.^{[4] [6]}

The seeds of *Benincasa hispida* consist of 53.3 per cent shell and the remainder kernel. The kernels are rich in fatty oils - palmitic, 10.6; stearic, 5.8; arachidic, 0.3; oleic, 20.0; linoleic, 62.4; and linolenic, 1.0%. The unsapon matter (1.47%) contained β -sitosterol. In general seeds are very rich in

unsaturated fatty acid. Fatty acid components of seed were reported to be linoleic acid, oleic acid and saturated acids. Protein isolated from the defatted seeds had the following composition: pure protein, 92.05; ash, 4.3; and moisture, 2.95%. The amino acid make-up of the protein was: arginine, 31.2; histidine, 4.5; lysine, 1.8; tryptophan, 3.2; phenylalanine, 0.7; cystine, 1.7 methionine and tyrosine, 2.3; threonine, 1.6; leucine, 7.0; aspartic acid, 10.8; glutamic acid, 21.3; proline, 5.8; and serine, 3.3 g/100g of protein.⁷ it is used as ingredient of some important Ayurvedic formulations like Kushmandavaleha, Kushmanda Rasayan, Khanda Kushmandavaleha etc.^[7]

MATERIAL AND METHODS:

Collection of Sample

The seeds of *Benincasa hispida* were procured from Agra (U.P.) by Pharmacy of IPGT & RA, GAU, Jamnagar and collected samples were identified and authenticated by pharmacognist with the help of different floras and databases in the Pharmacognosy Department of IPGT & RA, G.A.U., Jamnagar. The seeds were preserved in a solution of formalin-aceto-alcohol. (FAA)

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Pharmacognostical Study

Macroscopic and Microscopic studies and Powder microscopy were done with available guideline at Pharmacognosy Lab, I.P.G.T and R.A, Jamnagar.^{[8]-[19]}

RESULT AND DISCUSSION:

Macroscopic characters:

The seeds were found slightly hard, yellowish white in colour, compressed on both sides, ovate to oval in shape, narrow at one end and broad at other end. At the narrow end there is the minute micropyle and hylum located near to it. The margin is slightly grooved on both sides. Seeds are 10-12 mm in length and 5-7 mm broad. (Fig. 4)

Microscopic characters:

Testa: The epidermal cells of the testa are comparatively smaller in size and closely arranged and having unicellular hairs, especially on its apical end. (Fig. 7 & 8) The middle part of the testa just below the epidermis, is made up of 4-6 layers of sclereids of various sizes and shapes. They are mostly oval to spherical in shape with wide lumen. (Fig. 7 & 8) The lowermost part of testa is made up of stone cells. The cells are mostly closely arranged, highly thick walled and with narrow lumen. All these cells are lignified. (Fig. 9)

Perisperm: Inner to the testa, there is a narrow perisperm made up of 2-3 layers of thin walled parenchymatous cells containing oil globules, aleurone grains and very few starch grains. (Fig. 9)

Endosperm: In between the embryo and perisperm there is a narrow endosperm made up of thin walled parenchymatous cells and all the cells also contain oil globules, aleurone grains and few starch grains. (Fig. 9)

Embryo: The embryo lies at the centre of the seed, has two thick cotyledons and a radicle at one end. (Fig. 6)

Cotyledon: The Transverse Section of thick cotyledons of the embryo consists of a layer of rectangular shaped, closely arranged epidermis on both upper and lower side. In between the epidermis there are radially elongated thin walled palisade like, parenchymatous cells filled with oil globules, aleurone grains and few starch grains. The middle region consists of slightly smaller mesophyl cells of spongy parenchyma. (Fig. 10)

The Longitudinal Section of seed shows outer thick and hard testa and a large embryo with two thick cotyledons and pointed radicle. Trichomes arise on the epidermis of the testa. (Fig. 6)

Table 1: Organoleptic characters of *Benincasa hispida*

Colour of the powder	Yellowish white
Texture	Slightly smooth & gritty
Odour	Characteristic
Taste	Characteristic

Powder microscopy of seed:

Powder shows fragments of thick walled epidermis of testa with unicellular trichomes; wide lumen sclereids of middle part of the testa; highly thick walled, lignified, narrow lumen stone cells from the inner most part of the testa;

parenchymatous cells of perisperm and endosperm; cotyledon showing epidermal and palisade like cell. (Fig. 11)

CONCLUSION:

The plant shows variety of morphological and anatomical characters, which is helpful in the identification of the authentic sample and checking the adulteration and substitution.

In the macroscopic study it was found that the seeds were slightly hard, compressed, ovate to oval in shape, narrow at one end and broad at other end and on breaking the testa, the kernel could be separated easily. Microscopic study of seed of Kushmanda revealed presence of plenty of oil globules and aleurone grains and very few starch grains in perispermic, endospermic and cotyledon cells. Testa portion showed epidermis with trichomes, sclereids of different size and shapes and stone cells. The powder of the seed was found slightly smooth and gritty, slightly yellowish white in colour with faint characteristic odour and characteristic in taste. The powder showed abundant fragments of sclereids, fragments of perisperm, endosperm and cells of cotyledon containing oil globule, aleurone grains and few starch grains. On the basis of above findings identification and differentiation of seed from other species of cucurbitaceae can be done.

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Fig. 1: Showing fruit, leaf and flowers of



Fig. 2: Showing flower of Kushmanda.



Fig. 3: Showing piece of fruit of Kushmanda.



Fig. 4: Showing seed of Kushmanda.

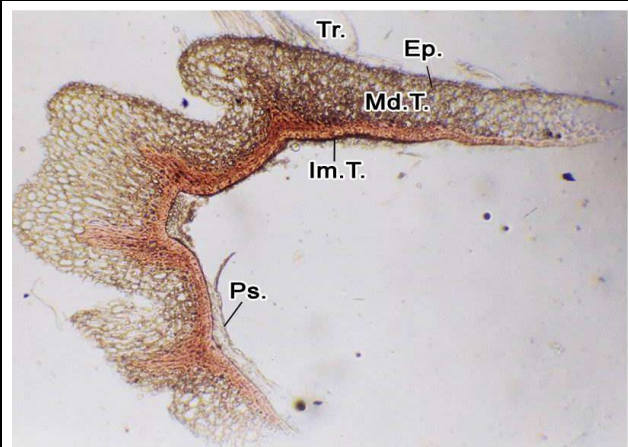


Fig. 5: Transverse section of seed showing Tr., Ep., Md.T., In.T. & Ps.

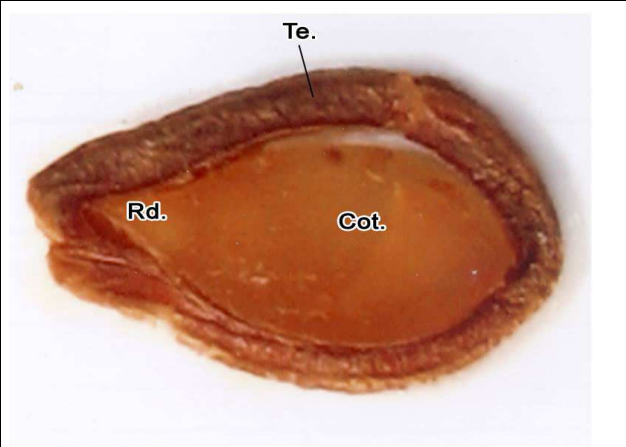
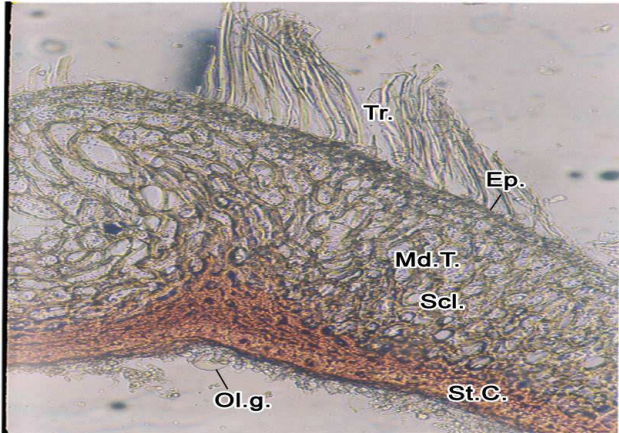
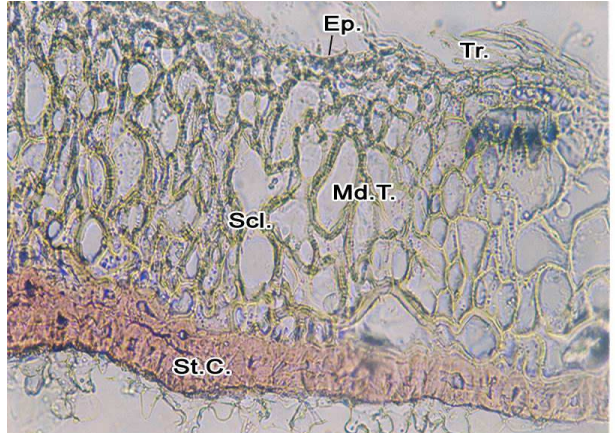
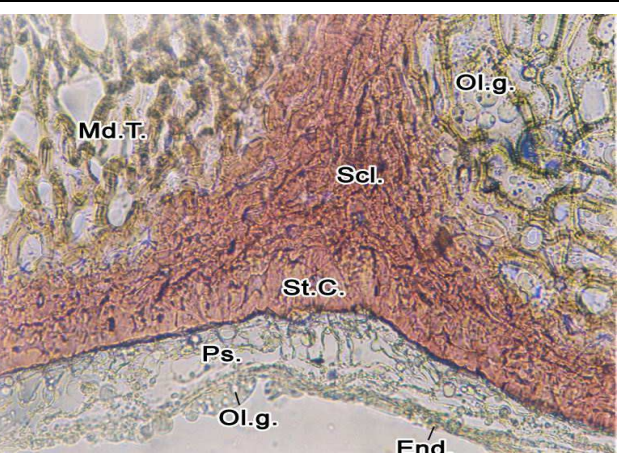
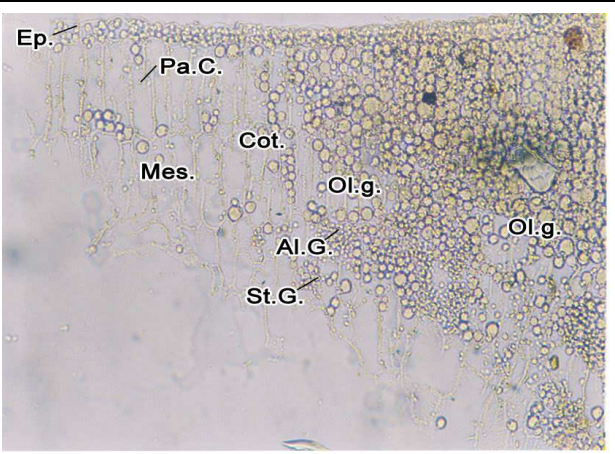
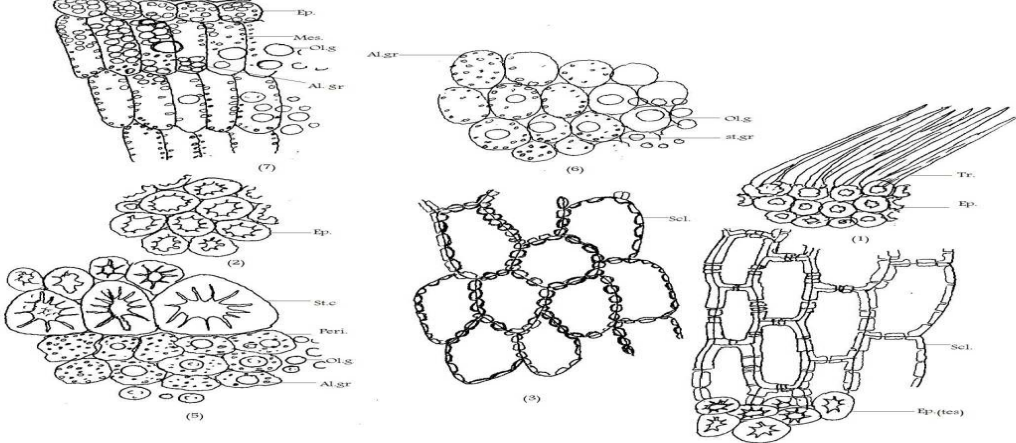


Fig. 6: Longitudinal view showing Te., Cot. & Rd.

Tr. - Trichomes, Ep. - Epidermis, Md.T. - Middle part of testa, Im.t. - Inner part of testa, Ps. - Perisperm, Te. - Testa, Cot. - Cotyledon & Rd. - Radicle.

	
<p>Fig. 7: Transverse section of seed showing Tr., Ep., Md.T., Scl., St. & Ol.g.</p>	<p>Fig. 8: Transverse section of seed showing Tr., Ep., Md.T., Scl. & St.</p>
	
<p>Fig. 9: Transverse section of seed showing Md.T., Scl., St.C., Ol.g., Ps. & End.</p>	<p>Fig. 10: Transverse section of seed showing Ep., Pa.C., Mes., Cot., Ol.g., Al.G. & St.G.</p>
	
<p>Fig. 11: Photograph showing hand drawn characters of the drug Ep., Tr., Scl., St.c., Per., Ol.g., Al.g., St.g., & Mes.</p>	
<p>Tr. - Trichomes, Ep. - Epidermis, Md.T. - Middle part of testa, Scl. - Sclereids, St.C. - Stone cells, Ol.g. - Oil globules, Ps. - Perisperm, End. - endosperm, Pa.C. - Pallisade cells, Mes. - Mesophyll cells, Al.g. - Aleurone grains & St.g. - Starch grains.</p>	