

## SEED SURFACE CHARACTERISTICS AND PRELIMINARY PHYTOCHEMICAL ANALYSIS OF *Centratherum anthelminticum* (L.) Kuntze. OF FAMILY ASTERACEAE (COMPOSITAE)

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### ABSTRACT

The *Centratherum anthelminticum* (L.) Kuntze. is an important medicinal plant belonging to family Asteraceae (Compositae). The fresh powder for preliminary phytochemical analysis and seed coat study were carried out to determine its micromorphological characters. The seeds of *Centratherum anthelminticum* (L.) Kuntze. used for morphological and anatomical study. For morphological observations of seedcoat shows awned pappus scales with number of ridges, trichome or hairy deposition on the surface. In seedcoat anatomy shows the well ornamented surface features. Presence of outer epidermis wavy, globoidal aluerone grains and lipid globules, vascular bundle, integumental layer thin. Medicinally seeds are very important. Protein concentration observed in the seed sample. In preliminary phytochemical analysis of seed sample observed various component present in it. The phytochemical analysis of seeds shows photochemical like steroids, terpenoids, tannins flavonoids, alkaloids, saponines, carbohydrates, glycosides, phenolic compounds present in it. Ethyl acetate, ethanol, methanol used as an extract. Surface characters and anatomical characters of seed coat solved various problems related to taxonomic level. It is used in the preparations of many ayurvedic drugs also on asthma, kidney troubles and cough, psoriasis, skin disorder etc. So preliminary phytochemical analysis of medicinal plants is essential to discover and develop therapeutic efficacy and helps in new drug discovery which is beneficial in phytomedicine.

**KEYBOARDS:** Seed morphology, Scanning electron microscopy (SEM), seed anatomy, biochemical, phytochemical analysis.

### INTRODUCTION

Plants are the basic and important source on the Earth. Human society is in large quantity depends on the plants for their basic needs. Plants are primary source for other necessity of life. For life they provide healthy environment and eco-friendly atmosphere. Plants are also use for medicinal purposes. They help for preparation of various drugs in pharmaceutical industries. It contain various phytochemicals which is detected by preliminary phytochemical analysis. The *Centratherum anthelminticum* Willd. is a annual herb occurred all over India. The local name of *Centratherum anthelminticum* (L.) Kuntze. is 'Kalijira'. It belongs to Asteraceae (Compositae) family and relative of sunflower. *Centratherum anthelminticum* (L.) Kuntze. synonym *Vernonia anthelmintica* found in Himalaya, Khasi hills. Inflorescence is many, subcorymbos and in clusters. (<https://www.bimbima.com>). All the organs of plants like roots, leaves, stem, seeds etc. have their medicinal importance.

The seeds of *Centratherum anthelminticum* (L.) Kuntze. are used in Ayurvedic and folk medicines. The seeds surface characteristics help for detection of various components present in it. Seed morphology and anatomy detect the seed coat pattern. Seed recognition is important in farming. All the parameters of seeds are most important for the identification of seeds. Detection of various compounds and identification of seed helps the agriculture, biologist, forester, horticulturist, ethanobotanist, pharmacist and other interested in land used programme (Thakor A.B.2009). It is cultivated for medicinal purpose.



Fig. 01



Fig. 02

Fig. 1: *Centratherum anthelminticum* (L.) Kuntze plant habit. Fig. 2: Inflorescence Subcorymbos and In clusters.

#### MATERIALS AND METHODS

- A) **Sample collection:** - Some seeds of family Compositae like *Centratherum anthelminticum* (L.)Kuntze. were collected from BSIP Institute Lucknow. 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.
- B) **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.
- C) **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 grade like 30%, 50%, 70%, 90% absolute alcohol, xylene, DPX etc. The staining like safranin and light green stain used for staining.

- D) **Priliminary 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, carbohydrates, reducing sugars, steroids, glycosides, flavonoides, terpenoides, saponine, protein, tannins, amino acids, volatile oil or essential oil. Preliminary phytochemical test were done using different extract.
- E) **Protein test:-** Detection of protein by using **Biuret** and **Xanthoproteic test**. In Biuret test 1 ml seed pulp in a test tube treated with 2 ml solution of 20%NaOH and a drop of 1% CuSO<sub>4</sub>.Then test tube was shaken for few minutes. The pulp turns violet which indicates the presence of protein. In Xanthoproteic test 1 ml seed pulp in a test tube treated with 2 to 3 ml of concentrated nitric acid. The pulp turns yellow which clearly indicates the presence of protein.

#### OBSERVATIONS



Fig. 03



Fig. 04



Fig. 05

Fig. 03, 04: Seed sample of *Centratherum anthelminticum* (L.) Kuntze. Fig. 05: Magnified seed of *Centratherum anthelminticum* (L.) Kuntze.

Morphologically seeds of *Centratherum anthelminticum* (L.) Kuntze. shows size ranges in between 0.48cm-0.12cm, elongated, black, 2.94mg, bilateral, hilum apical, circular, hairs on surface, seed show thick, ridges or division on surface with slightly waxy deposition., seed is tapering at base, apex circular and fibrous, crown like.(Fig:-03,04,05) In Scanning electron microscope,

the seed surface shows cap like basal region. Surface shows elongated thick fibrous, hairy division with small granulated deposition. Hairy deposition like awned pappus scales are developed on surface. Crown like projection on apical region. Basal part thick.(Fig:-06,07)

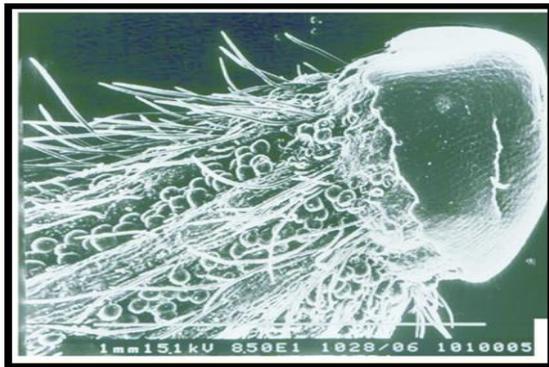


Fig. 06



Fig. 07

Fig. 06: SEM study of seed *Centratherum anthelminticum* (L.) Kuntze. Shows cap like basal region, fibrous, hairy, granulated depositions. ( $8.50 \times 10^1$ ). Fig. 07: Awn pappus scales with fibrous, granulated deposition towards apical part, Seed shows crown like projection on apical region ( $5.05 \times 10^1$ ).

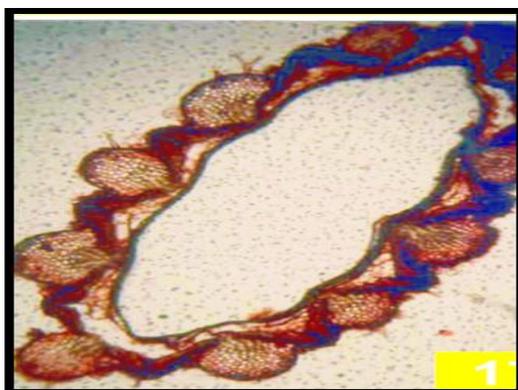


Fig. 08

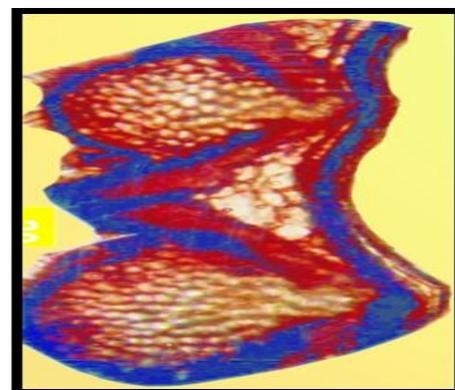


Fig. 09

Fig. 08: T. S. of *Centratherum anthelminticum* (L.) Kuntze. (160X) section well ornamented, wavy epidermis. Fig. 09: T. S. of *Centratherum anthelminticum* (L.) Kuntze. (640X) circular patches with vascular bundle triangular in manner.

In the anatomical seed coat study shows ornamented structure. Section shows wavy outline. Outer pericarp shows cellular variation. Epidermis wavy, one layered, Parenchymatous. Hairy trichomes are present on them. Circular ridges present in section. The parenchyma cells network present in them. Vascular bundles are present. The sclerenchyma patches are present in between two

ridges in triangular manner. Seedcoat thin and well developed. Small pits are also present in section. Endosperm and cotyledon well developed with oil globules. The outer epidermal hair measures 116.3µm in length and 11.63 µm in breadth. Parenchymatous cells measures 23.26 µm in length and 11.63 µm in breadth.

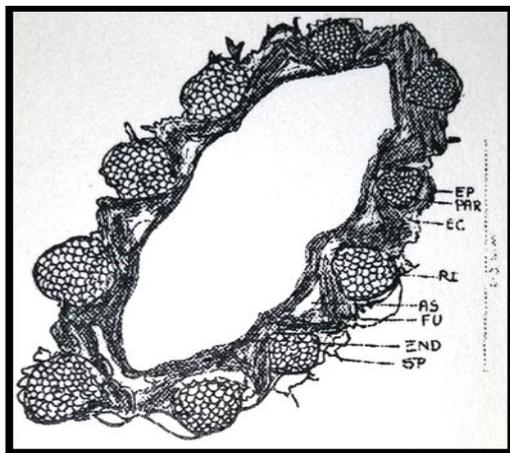


Fig. 10

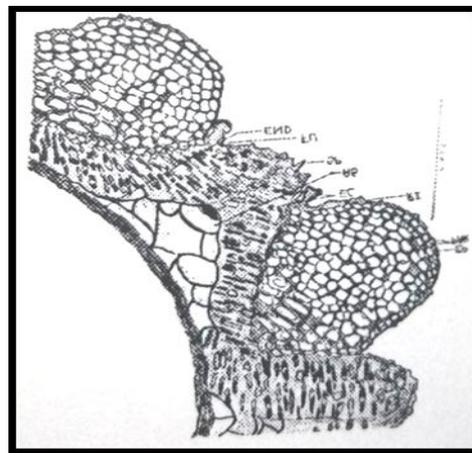


Fig. 11

Fig. 10(100X): T. S. of seed coat of *Centratherum anthelminticum* (L.) Kuntze. whole section, Fig. 11 (400X): T.S. of seed coat of *Centratherum anthelminticum* (L.) Kuntze. cellular sketched diagram, ornamented wavy structure with epidermis, vascular bundle, sclerenchyma with small pits, endosperm and cotyledon with alureon grains and oil droplets. EP- Epidermis, PAR-Parenchyma, RI-Ridges, EC-Elliptical cells, FU-Furrows, END-Endosperm.

In preliminary phytochemical analysis seed powder treated with different extract like ethyl acetate, ethanol, methanol etc. In ethyl acetate extract alkaloids, steroids, flavonoids, tannins etc. are present. Ethanol shows alkaloids, flavonoids, terpenoids, tannins, aminoacids,

volatile oil or essential oil present. In methanol alkaloids, steroids, glycosides, flavonoids, terpenoids, tannins are present. The protein concentration of seeds shows more concentration in biuret test as compare to xanthoproteic test.

**Observation table (01): Study of preliminary phytochemical analysis.**

Sr. no.	Phytochemicals	Ethyl acetate	Ethanol	Methanol
01	Alkaloids	+	+	+
02	Carbohydrates	-	-	-
03	Reducing sugars	-	-	-
04	Steroids	+	-	+
05	Glycosides	-	-	+
06	Flavonoides	+	+	+
07	Terpenoides	-	+	+
08	Saponine	-	-	-
09	Protein	-	+	-
10	Tannins	+	+	+
11	Amino acids	-	+	-
12	Volatile oil or essential oil	-	+	-

Present (+), Absent (-)

**Obaervation table (02): Study of concentration of protein in seed samples.**

Sr. no.	Botanical name	Family	Biuret test	Xanthoproteic test
01	<i>Centratherum anthelminticum</i> (L.)Kuntze.	Compositae	+++	++

The above study shows that various active constituents found in different extract in the preliminary

phytochemical study. The active constituents like alkaloids, flavonoids, tannins are present in all the three

extract while glycosides, protein, amino acids, volatile oil or essential oil found only in one extract. Carbohydrates, reducing sugars saponine, concentration not seen in them (**Table:-01**). The concentration of protein in seed sample were detected by using biuret and xanthoproteic test (**Table:-02**).

#### Medicinal uses

Medicinally seeds are very important. Seeds are stimulants, antiseptic and anthelmintic, destroy worms and promote urination, use to treat skin disease. (Sharma 2003) The *Centratherrum anthelminticum* (L.)Kuntze. seed contain Delta-7-avenesterol,vernesterol and demanolide (<http://www.easyayurveda.com>)

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#### DISCUSSION

From the above observations we studied morphology, anatomy, phytochemical analysis, protein detection of the powdered drugs. For seed identification these study is important. It shows specific structure in the morphological and anatomical study. The shape, size, symmetry, hilum position and shape are also the important parameters that characterize the identity of seeds. Seed permeability depends on the nature of the seedcoat. Study of spermoderm through scanning electron microscopy is one of the most important identification technique. Transverse section helps to identify anatomical details. Seed diversification present in both external and internal view. The biochemical and phytochemical tests are essential for the detection of various components inside the seeds of Asteraceae (Compositae). The extensive study of seed coat pattern also provides important characteristics in resolving the affinities and relationships among closely related taxa (Thothathri and Pramanik 1996).

Plants are the richest resource of drugs in the field of folk medicine, modern medicine, traditional medicine etc. The seeds or seed coat are known to have capacity to store various alkaloids or chemicals. These study helps for determine nutritive and pharmaceutical importance. Medicinal use of a seeds were tested in using different formulations in research laboratories, pharmaceutical industries for their scientific, economic and beneficial use. It is used on leucoderma, skin diseases, asthma, pain, fever, cough etc. In Ayurveda *Centratherrum anthelminticum* (L.)Kuntze.(Kalijira) is richest medicinal properties. All the observations helps to study the micromorphological surface features of seed coat for identification. It also helps for preparation of drugs which is useful on various diseases. It is ethnomedicinal plant, so it increases potential theruptic value which is beneficial to the society.

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