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PHARMACOGNOSTIC STUDY AND DEVELOPMENT OF QUALITY CONTROL PARAMETERS FOR THE BIJA OF CAKRAMARDA - (Seed of *Cassia tora* Linn.)

Research article

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ABSTRACT

Cakramarda is commonly known as Ringworm plant which has great therapeutic potential and significant Pharmacological Activity. The drug was described and found extensively in Vedas, Samhitas and Nighantus mentioned along with the dietic preparations and its therapeutic indications. The Great Indian Medicinal Science-Ayurveda, mentions it's use in various diseases mainly Dadru Kushtha (Fungal infection). The study was carried out on Bronchial Asthma in Department of Dravyaguna, at S.V.Ayurvedic College, Tirupati, which showed Phenomenal results in Bronchial Asthma. Basically, in traditional folklore medicine the *Cassia tora* Linn. seeds were used in the form of herbal tea as a strength promoter. As it is known to exhibit anti-fungal, anti-asthmatic, anti-helmintic, anti-oxidant, anti-microbial and hepato - protective properties it is known as most valuable medicinal plant. The Pharmacognositcal study of *Cassia tora* Linn. seed i.e., *Cakramarda Bija* was carried out at the SDM College UDIPI. The complete assessment of the Microscopic, Macroscopic evaluation of Cakramarda Seed and the Powder microscopy showed the presence of oil globules and aleurone grains. The Physico-chemical studies carried out were as per API standards except for the Total Ash. The detailed work is furnished in full paper.

Keyword *Cassia tora* seed, Pharmacognostic, Standardization, Macroscopic study, Microscopic study, Powder Microscopy, Physico- chemical study.

INTRODUCTION: *Cassia tora* Linn is an annual weed, stress tolerant, easily growing commonly available plant known as Sickle Senna. Stinking/Foetid Cassia which is distributed throughout India.[1] The Whole Plant, Root, Leaves, Seeds were extensively used in traditional system of Indian medicine and the roasted seeds were used a substitute to coffee.[2] It is one of the dietic plant placed under *ShakaVarga*[3] known to also have few culinary purposes. It is also indicated in Bronchitis (*Kasa),* Bronchial Asthma *(Svasa),* Worm infestations and Pathogenic infections *(Krimi roga),* it is drug of choice in *Dadru Kushtha* (Fungal infection) as per Ayurveda.[4] The Present study was mainly focussed on evaluation of Pharmacognosy which includes the determination of Microscopy, Macroscopy, Identification of the drug, Powder Microscopy and Physico-chemical studies of the *Cakramarda Bija*.

Aim: To standardize Pharmacognostic study of *Cakramarda* (*Cassia tora* Linn.) for the identification features of the seeds and development of quality control parameters for the *Bija* of *Cakramarda.*

MATERIALS AND METHODS:

Collection and Identification of the plant:

The Seeds of *Cakramarda* (*Cassia tora* Linn.*)* was collected from the local market, Tirupati, Andhra Pradesh. Genuine, good quality material which are free from any worm infestations were collected. The fresh pod was collected during March, it was sent to Sri Dharamasthala Manjunatheswara Ayurvedic Medical College, Department of Pharmacognosy

and Phyto-chemistry for thorough examination of the specimen. The powder of Cassia *tora* Linn. Seed (*Cakramarda*) was also sent for Physico-chemical studies. The plant specimen was authenticated by Dr. Renu Dixit, HOD, Professor, S.V. Ayurvedic College, Department of Dravyaguna, Tirupati and research officer Ms. Suchitra Narayan prabhu, Department of Pharmacognosy and Phyto-chemistry Sri Dharamasthala Manjunatheswara Ayurvedic Medical College (SDM), UDIPI.

DETAILS OF PHARMACOGNOSTICAL SAMPLE OF SEED:

Name of the Sample : **Cakramarda**
Scientific Name : ***Cassia tora* Linn.**
Family : ***Caesalpinaceae***
Parts used : **Seed**

PREPARATION FOR MICROSCOPIC STUDY:

Sample was preserved in fixative solution. The FAA received the materials after more than 48 hours. Using a sharp knife, the preserved specimens were cut into thin transverse pieces, which were then dyed with saffranine. Zeiss AXIO trinocular microscope equipped with Zeiss Axio Cam camera was utilized for taking transverse section photos in bright light. The scale bars indicate the figures' magnifications.

PHARMACOGNOSTIC STUDY OF CAKRAMARDA BIJA

A. MACROSCOPIC STUDY: The external features of the test samples were documented using Canon IXUS digital camera. For authenticity, the macroscopic characteristics were compared to the indigenous flora.

B. MICROSCOPIC STUDY: The internal structures of the test samples were documented using Canon IXUS digital camera. The microscopic features were compared to local flora for authentication.

C. POWDER MICROSCOPY: Pinch of *Cakramarda Bija (Cassia tora* Linn. *seeds)* powder previously sieved was put on the slide and mounted in glycerine and powder characters are observed under the Zeiss AXIO trinocular microscope attached with Zeiss Axio Cam camera under bright field light.

PHYSICO-CHEMICAL STUDY IDENTIFY, PURITY AND STRENGTH METHODOLOGY

1) **Loss on drying at 105°c:** 10 g of sample was placed in tared evaporating dish. It was dried at 105˚C for 5 hours in hot air oven and weighed. The drying was continued until difference between two successive weights was not more than 0.01 after cooling in desiccator. The weight of the sample was used to compute the percentage of moisture.

2) Total Ash: 2 g of sample was incinerated in a tared platinum crucible at temperature not exceeding 450˚C until carbon free ash is obtained. The weight of the sample was used to compute the percentage of ash.

3) Acid insoluble Ash: To the crucible containing total ash was added with 25ml of dilute Hcl and boil. Collected the insoluble matter on ash less filter paper (Whatmann 41) and washed with hot water until the filtrate was neutral. Placed the filter paper holding the insoluble material back into the original crucible, let it to dry on a hot plate, and then lit it under constant weight. Allowed the residue to cool in suitable desiccator for 30 mins and weighed without delay. Determined the acid insoluble ash content with the drug that had been air dried.

4) Water soluble ash: Boiled the ash for 5 min with 25 ml of water; collected insoluble matter on an ash less filter paper, washed with hot water, and lit for fifteen minutes at a temperature not to get above 450˚C. Subtract the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash with reference to the air-dried sample.

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OBSERVATION AND RESULTS

i) Macroscopic description:

Seed: smooth, shiny, greenish-brown to brownish-black, odourless, taste harsh; hard, 1 cm long, 3–4 mm thick, oblong or rhombohedral, both ends seeming as though chopped off obliquely.[5]

ii) Organoleptic characters:

- **Size** : Length- 1cm long
- **Shape** : Rhombohedral
- **Colour** : Greenish brown to brownish black
- **Taste** : Bitter
- **Odour** : Odorless

Figure 1: Macroscopy of *Cakramarda Bija (Seed of Cassia tora*Linn.*)*

a) Cakramarda plant

b) Legume

c) Fresh seeds

Microscopy of *Cakramarda Bija(Cassia tora seeds)*

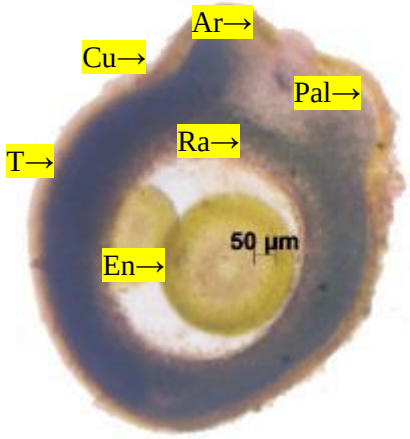


Figure 2 TS of seed

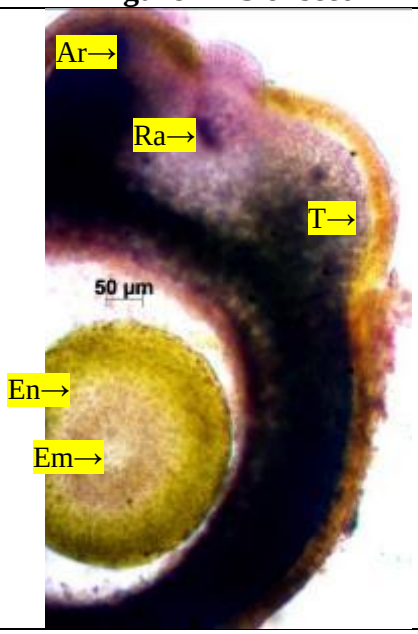


Figure 3 A portion enlarged

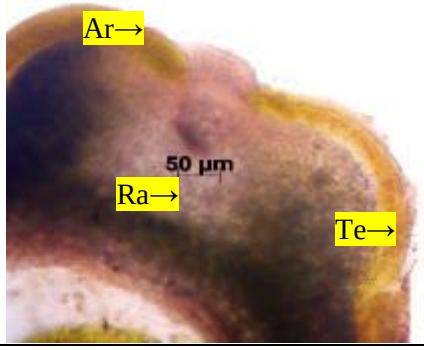


Figure 4Testa and Raphae

Ar- Arillus; Cu – cuticle; Em – embryo; En – endosperm; Pal – palisade; Ra – raphe; T – testa

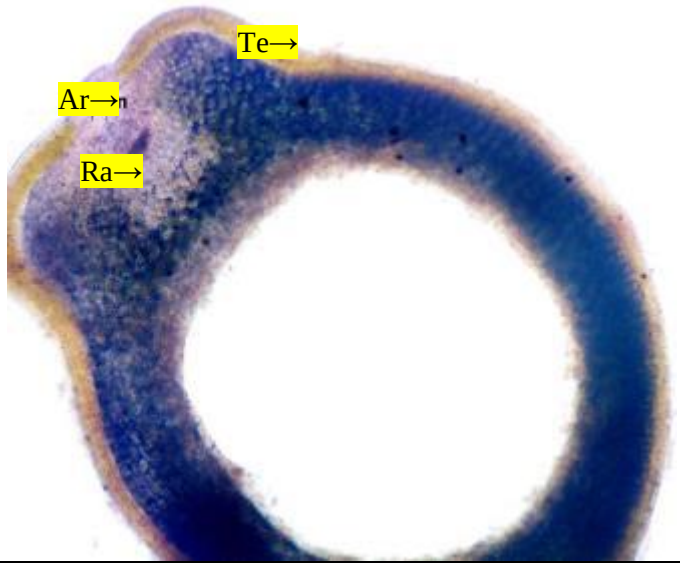


Figure 5 Testa and nutritive layer

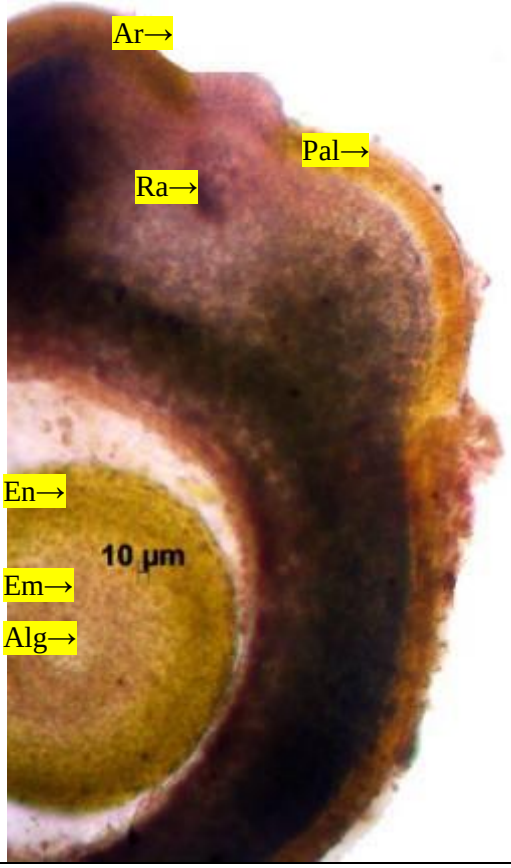


Figure 6 Endosperm containg starch, oil globules and aleurone grains

Ar- Arillus;Alg – aleurone grains; Cu – cuticle;Em – embryo; En – endosperm; Pal – palisade; Ra – raphe; T – testa

Powder microscopy of *Cakramarda Bija (Cassia tora* Linn. *seeds)*

Figure.7 Epidermis of testa

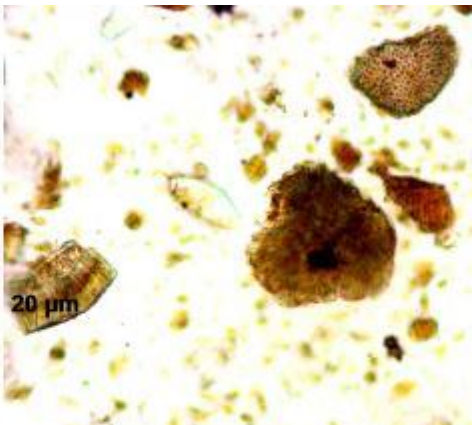


Figure 8 Palisade cells lateral, Palisade cells, in surface view

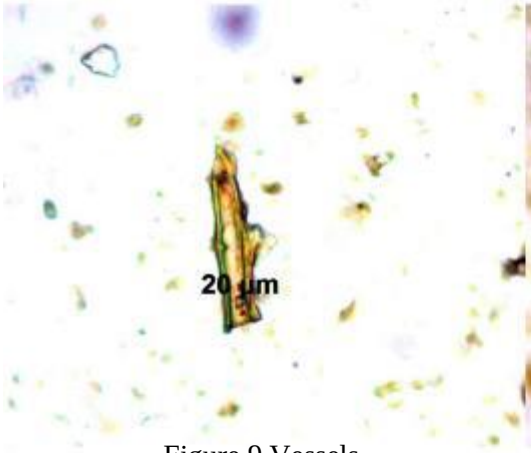


Figure 9 Vessels

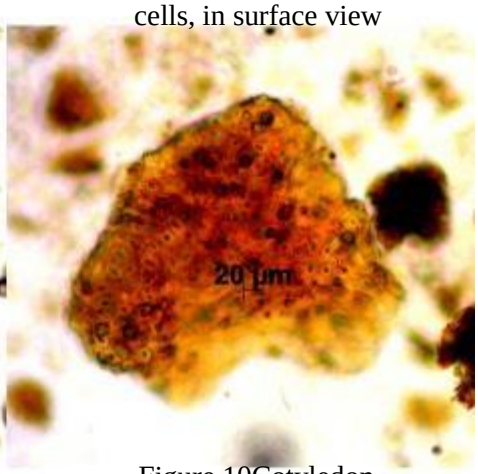


Figure 10Cotyledon

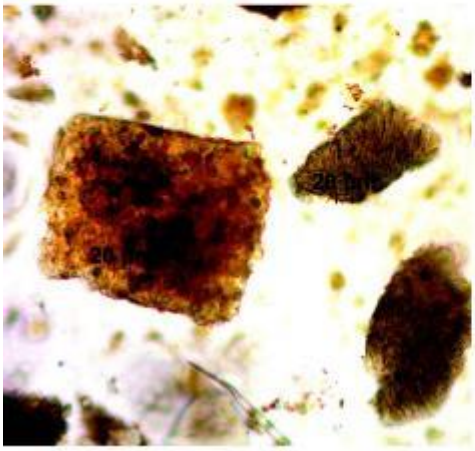


Figure 11Cotyledon cells

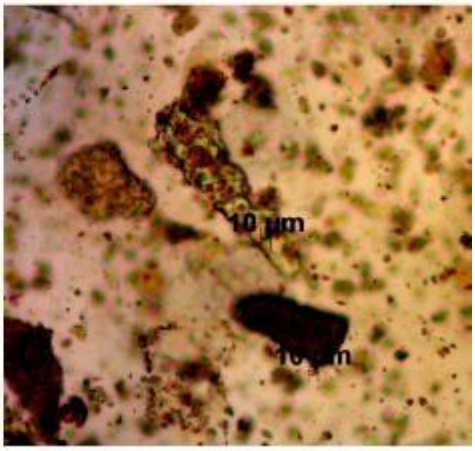


Figure 12Reticulate parenchyma of testa

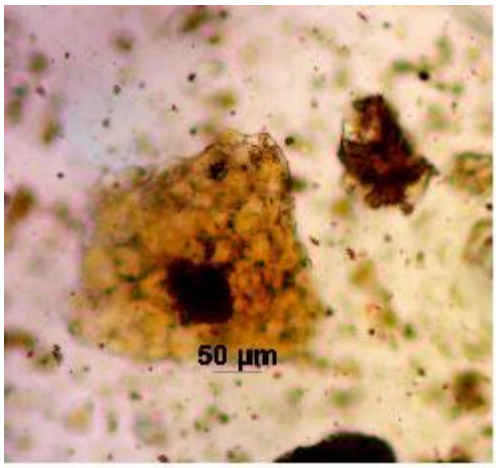


Figure13 Parenchyma with content

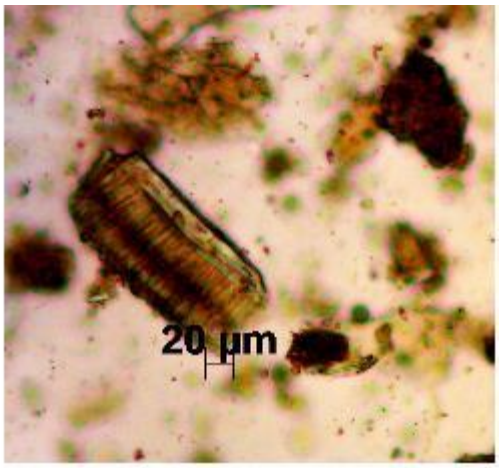
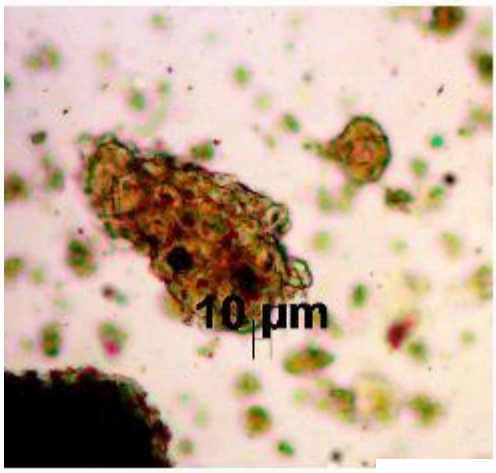


Figure14 Palisade cells



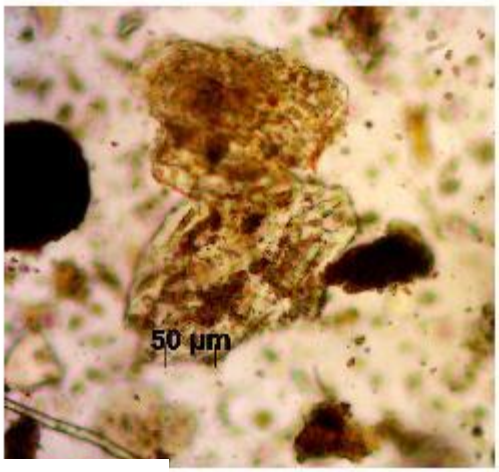


Figure 15Endosperm

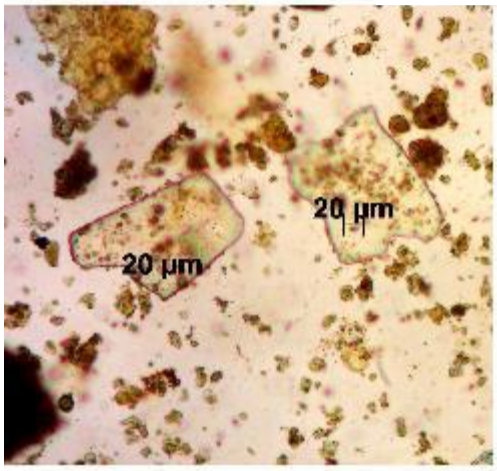


Figure 16 Perisperm

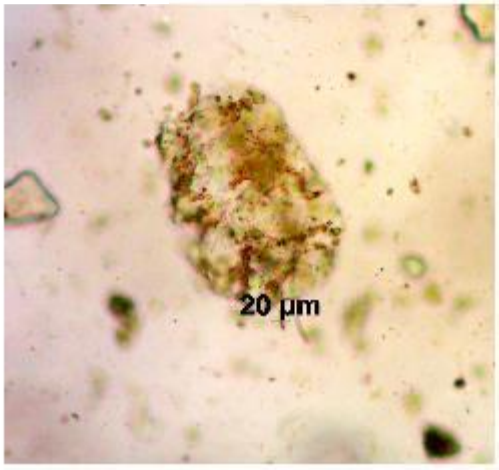


Figure 17 Mesophyll

Microscopic Study: A palisade layer made up of densely packed, radially organized, non-lignified, thicker columnar cells is present in the seed coat, which is made up of longitudinally elongated cells coated with a thick, smooth cuticle. The single layer of dumb-bell shaped, thick-walled, Parenchymatous cells are noticed with a wide zone of thick-walled, the parenchymatous cells that comprise the inner layer of the testa differentiate into 8 to 10 outer layers of tangentially elongated parenchymatous cells and a single layer of broad, squarish cells. This zone has a few scattered vascular bundles. The embryo consists of radicle, plumule and two cotyledons. Epidermis of cotyledon is surrounded by a single layer, externally covered with cuticle, followed by two layers of palisade like cells of mesophyll. The Mesophyll of ventral side composed of rectangular to polygonal cells filled with round to oval starch grain, measuring 10 µ in diameter is also recognized. A few vascular bundles and a few rosette crystals of calcium oxalate up-to 50 µ in diameter are scattered in this region. Endosperm consists of starch, aleurone grains and oil globules.[6]

Powder Analysis: The sample has appeared Light brown in colour. Epidermis of testa shows fragments of testa, Parenchymatous cells measuring 20 µm in diameter and parenchyma with content measuring 50µm.The fig 8 depicting the surface view containing the palisade cells measuring about 20µm. There are very small, numerous, simple, round to oval, starch grains measuring 10 µ in diameter are also seen. Few rosette crystals of calcium oxalate up to 50 µ in diameter are present in the powder analysis of *Cassia tora* Linn. Seed powder extract.[7]

Table No. 1 Observation and Results of standardization parameters of Cakramarda Bija (*Cassia tora*Linn.)[8]

Parameter	Results n = 3%w/w	API (Appendix 2.2.2.-2.2.7)
Loss on drying	7.43 ± 0.02	
Total Ash	6.92 ± 0.05	Not more than 5%
Acid Insoluble Ash	0.00±0.00	Not more than 0.2%
Water soluble Ash	1.71 ± 0.01	
Alcohol soluble extractive value	16.18 ± 0.01	Not less than 7%
Water soluble extractive value	16.61 ± 0.01	Not less than 14%

DISCUSSION: The standardisation of the crude drug is an integral part for establishing its correct identity and also having good quality control. Any drug included in Ayurvedic Pharmacopeia, Pharmacognostic parameters and standards must be established. The morphological characters of Seed can serve as diagnostic parameter which is one of the simplest and cheapest method to identify the source of the drug. The Pharmacognosticaland Physico- Chemical studies of *Cassia tora* Linn. were carried out well in SDM institute UDIPI. The given sample which is known to show useful results that help in identification of significant features in the transverse section of seed. The seed coat showed the presence of single layer with radially arranged non lignified columnar cells and few vascular bundles

with the presence of embryo consisting radicle, plumule and two cotyledons. The epidermis of cotyledon consists of two layers of palisade like cells of mesophyll which showed the presence of starch grains, few vascular bundles scattered in this region. The Endosperm containing starch, oil globules and aleurone grains. The Powder microscopy of the seed also revealed the features like fragments of testa, light brown in colour and presence of few rosette crystals of calcium oxalate and starch grains in Transverse section.

The Physico chemical studies of Cakramarda Bija was studied and the following findingswere noted to ensure the quality and to standardize the Physico-Chemical parameters of the drug.

- Moisture content of dry powder of CakramardaBijai.e, **7.43 ± 0.02**which seems to be lower than that of necessary to support the growth of microbes such as Bacteria, Fungi and yeast which may bring changes in the composition of the drug.The loss on drying of **7.43 ± 0.02** shows that *Cakramarda* seeds have more presence of moisture content and oil content.
- In Physico-chemical parameters, ash values are determined in three forms such as Total ash, Water soluble ash, Acid insoluble ash values i.e., **6.92 ± 0.05**not more than 5%**, 1.71 ± 0.01, 0.00±0.00**not more than 2%. respectively.Total ash of **6.92 ± 0.05** is bit higherthan **API** may be because of presence of moreCalcium oxalate crystals in this region and geographical effect of Tirupati. The area has low rainfall and has more rocks and hills around.
- Alcohol and water-soluble extractives are within API limits i.e., **16.18 ± 0.01, 16.61 ± 0.01** which are not less than 7% and not less than 14% respectively.The extractive values given idea about the chemical constituents and solubility of the drug. From the above observation of Alcoholic and water extractive values, it can be noted that ***CakramardaBija (Cassia tora* Linn.)** is soluble in alcohol and water equally.
- So the sample collected is equivalent to API standards.

CONCLUSION: The details of Pharmacognostic characters, various evaluation parameters, results of preliminary Physico-chemical analysis of present study facilitates the identity, standardization and quality control of the genuine drug, Cakramarda (Seed of *Cassia tora* Linn.) and also useful in the preparation of monographs of seed of Cakramarda. The present study of Seed of (*Cassia tora* Linn.) Cakramarda of Tirupati region will help as reference data in Qualitative evaluation for the identification of standard drug and its adulterants. To conclude, this study could be used as diagnostic for the standardization of Cakramarda Bija and also characterization of this drug.

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