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PHARMACOGNOSTIC STUDIES OF *COCCINIA GRANDIS* LEAVES

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ABSTRACT

Objective: To rationalize the macroscopial, anatomical and physico-chemical studies on leaves of plant *Coccinia grandis* (Cucurbitaceae). **Methods:** The of leaves of *Coccinia grandis* (Cucurbitaceae) was using for morphology, microscopy and physico- chemical parameters like loss on drying, extractive value, ash value. **Results:** An effort has been made to emphasise this folk herbal remedy through the current study, which will help with the morphological and physiochemical identification of fresh as well as dried crude leaf samples. **Conclusions:** By using market samples utilised in the production of different herbal medications, the current study will offer referring information for accurate identification and assistance in detecting adulteration. Studies on the leaves of *Coccinia grandis* (Cucurbitaceae) that are macroscopically, microscopically, and physiochemically aided by the current observation.

Keywords: Pharmacognostic study, *Coccinia grandis*, Leaves, Physiochemical parameter

1. INTRODUCTION

Plants and plant-derived products have been used as medicines since the dawn of human civilization. Worldwide, medicinal plants have significant economic worth. We are blessed by nature with a very rich botanical diversity, with many different kinds of plants growing in various regions of the nation **[I]**. About 75–80% of people still rely mostly on herbal medicine, and a significant portion of traditional therapy uses plant

extracts and their active ingredients. Phytochemicals created during the metabolic process of plants, such as steroids, saponins, tannins, flavonoids, phenols, alkaloids, terpenoids, etc., are responsible for the biological properties of medicinal plants **[2]**.

Coccinia grandis belongs to the Cucurbitaceous family, which has 960 species. The family is primarily found in tropical regions. The Cucurbitaceae family of plants is primarily made up of annual vines **[3]**. The small gourd, also known as Rantondli in Marathi, Bimba in Sanskrit, and Kandutikibel in Hindi, is a member of the Cucurbitaceae family and is also known by the synonyms *Coccinia grandis* and *Coccinia cordifolia*. Bengal and other regions of India are home to it natively. C. indica is widely distributed in the oriental countries, India, Australia, Fiji, and Tropical Africa. In the Indian subcontinent, the herb has also been widely employed in Unani and Ayurvedic medicine **[4]**.

The leaves are grouped in an alternating pattern along the stems, and they can have a heart- or pentagon-shaped form. (Up to 10 cm in length and width). The leaf's lower surface is hairy, while the upper surface is hairless. On the blade, close to the leaf stalk, are three to eight glands. The tendrils are basic. Dioecious *Coccinia grandis*. The flowers are star-shaped, big, and white. The fruit is elliptical to ovoid in shape and is red. The succulent, tuberous roots and stems may help the plant withstand protracted drought. Among other things, *coccinia grandis* is used to treat gastrointestinal issues, diabetes, respiratory illnesses, chronic sinusitis, urinary tract infections (UTI), and skin conditions like psoriasis and ringworm. Indian traditional medicine uses the leaves of this plant to cure a wide range of conditions, such as skin eruptions, inflammation, ulcers, wounds, asthma, diabetes, fever, and cough. The stem is effective in treating urinary tract infections, GI disorders, asthma, and bronchitis. It also has anti-spasmodic and anti-diabetic properties. Ivy gourd roots are used to cure skin lesions (Tenia), arthritis, mouth ulcers, wheezing, and phlegm **[5-8]**. Aerial part contains of the plant have Alkaloids Cephalandrins A and B, Cephalandrol, Heptacosane, β-sitosterol, and fruit and root contain -Amyrin acetate, carotenoids, lycopene, β-carotene, xyloglucan, cryptoxanthin, β-sitosterol, carbonic acid, resin, fatty acids, starch, alkaloids, saponin coccinoside, flavonoid glycoside, lupeol, **[9, 10]**. Consequently, in order to find and create novel bioactive compounds that could lessen human suffering, a thorough screening of therapeutic plants is necessary **[11-15]**. The current study examines the morphology, physiochemical characteristics, and microscopy of leaves of *Coccinia grandis*.

2. MATERIALS AND METHODS

2.1 Collection of Plant Material: The *Coccinia grandis* plant was collected from the medicinal garden of Rohilkhand Medical College, Bareilly, during the month of January- 2023. The collected leaves were dried under shade and crushed to coarse powder with mechanical grinder. The powder was stored in an air- tight container which was used for physiochemical evaluation.

2.2 Authentication of Plant: Plant authentication is the process of identifying a plant species. The plant was authenticated by Dr. Alok Srivastav, Associate Professor, Department of Plant Science, MJP Rohilkhand University, Bareilly. The voucher specimen of plant was DPS/MJPRU/04.

2.3 Chemicals and reagents: All chemicals were used of analytical grade and reagents were prepared in the distilled water. Ethanol, sulphuric acid, safranin, chloroform, methanol, ethyl acetate, n-butanol, acetic acid reagent was used.

2.4 Macroscopy & Microscopy Evaluation: Different organoleptic properties, such as form, size, type, colour, odour, and taste, were detected when fresh leaves of *C. grandis* were harvested. These factors are thought to be helpful for the crude drug's quality control. Using a microscope, fresh leaves were chosen for the microscopical criteria. Blades were used to cut the thin portion of leaf. The thin part was arranged such that the potatoes were in cube form. The section had a thickness of 20–25 µm. Safranin solution was used to stain the sections. Since Safranin is a polychromatic stain different colors of the cells were obtained depending upon the nature of the cells **[16-19]**.

2.5 Physicochemical Constants: Dried plant powdered *Coccinia grandis* was used for the determination of physicochemical constants in accordance with WHO guidelines.

2.5.1 Loss on drying: A predetermined amount of the materials was added to a silica crucible that had been lit, cooled, and then gently shaken from side to side to spread the material equally. Accurate weight measurements were taken of the crucible's lid and contents. The drying chamber (105°C) was filled with the loaded crucible and its lid. The material was heated to a steady weight for a predetermined amount of time. Before weighing, the crucible's lid was placed on it and it was left to cool at room temperature in a desiccator. In order to determine the drying loss in relation to the air-dried substance, the crucible was weighed at the end **[20]**.

2.5.2 Ash values: When assessing the quality and purity of a crude medication in powder form, ash values can be useful. The substance that remains after burning is called the drug's ash content, and it simply

refers to inorganic salts that are either inherently present in the drug or have been purposefully added to it as a means of adulteration **[21, 22]**.

i) Total ash: After 30 minutes of red-hot heat, the silica crucible was allowed to cool in a desiccator. A 2gm portion of powder was added to the silica crucible, and it was lit at a temperature that didn't go over 600 °C until free carbon was formed. It was then allowed to cool for 30 minutes in a desiccator before being weighed. With reference to the medicine that had been air dried, the percentage of ash was computed.

ii) Water soluble ash: Five minutes were spent boiling the entire amount of ash in 25 millilitres of water. The insoluble material was gathered in an ashless filter paper, cleaned with hot water, and burned for 15 minutes at a temperature that didn't go above 450 °C before being cooled and weighed. With reference to air-dried medication, the proportion of water-soluble ash was computed.

iii) Acid insoluble ash: Drop by drop, 25ml of dissolved HCl was added to the entire amount of ash and burned. After gathering the insoluble material in an ashless filter paper, hot water was used to wash the material until the filtrate was neutral. They put the insoluble material into a crucible. After the residue cooled for 30 minutes in a desiccator, it was weighed. The medication that had been air dried was used to calculate the acid insoluble ash concentration.

2.5.3 Determination of Extractive Values: For the assessment of phytoconstituents, extractive values are helpful, particularly in situations where it is difficult to quantify a drug's constituents by conventional methods. Additionally, these figures show what kind of active ingredients are in a crude medication **[23-25]**.

i) Determination of water soluble extractive: One hundred millilitres of chloroform water (95 millilitres of distilled water and 5 millilitres of chloroform) was macerated with five grammes of leaf powder for a full day in a closed flask. After being repeatedly shaken for six hours, it was left to stand for eighteen. After that, it was quickly filtered while being careful not to lose any solvent, and 25 millilitres of the filtrate were evaporated completely in a shallow dish with a flat bottom that had been tarred. With regard to the medicine that had been air dried, the percentage of water soluble extractive value was computed.

Water soluble extractive value = weight of the dried extract / weight of the sample taken × 100

ii) Determination of alcohol soluble extractive: A closed flask containing 5g of the powder was filled with 1000 ml of 90% ethanol and allowed to macerate for a whole day. After being repeatedly shaken for six hours, it was left to stand for eighteen. After that, it was quickly filtered while being

careful not to lose any solvent, and 25 millilitres of the filtrate were evaporated completely in a shallow dish with a flat bottom that had been tarred. In a hot air oven, it was dried for an hour at 105°C. After cooling in a desiccator, the dish was weighed. Until the constant weight was reached, the procedure was repeated. With reference to the air-dried medication, the percentage of alcohol-soluble extractive value was computed.

Alcohol soluble extractive = weight of the dried extract / weight of the sample taken × 100

iii) Petroleum ether soluble extractive: In a glass stopper flask, add roughly 5g of finely ground, air-dried material (leaves), precisely weighed. After macerating for six hours while shaking constantly with 100 millilitres of the relevant solvent (petroleum ether), let stand for eighteen hours. Quickly filter, being careful not to spill any solvent, then transfer 25 ml of the filtrate to a dish with a tarred bottom and let it dry on a water bath. After 6 hours of drying at 105 °C and 30 minutes of cooling in a desiccator, weigh right away. Determine how many milligrammes of extractable stuff there are in each gramme of air-dried material.

Petroleum ether soluble extractive = weight of the dried extract / weight of the sample taken × 100

3. RESULTS AND DISCUSSION

3.1 Macroscopic Examination: The apex of the leaf was mucronate, with a sinute edge and an uneven base. The leaves have a distinctive smell, are green in hue, and have a slightly bitter flavour. *Coccinia grandis* leaves, measuring 3–10 cm in length and 4–10 cm in width. The petiole of the multicosate reticular diverging type venetian had a little whorl, and its upper surface was glabrate while its lower surface was rough at the abaxial and hispid at the adaxial directions. **Table 1** provides specific findings from the organoleptic investigation.

Table 1: Organoleptic evaluation of *Coccinia grandis* leaves

S. No.	Parameters	Observation
1.	Colour	Fresh leaves are green and in the dry state greyish green
2.	Odour	Characteristics
3.	Taste	Slightly bitter
4.	Shape	Ovate in outline with a basal sinus (Heart to pentagon form)
5.	Size	3-10 cm in length, 4-10 cm in width
6.	Apex	Mucronate
7.	Base	Asymmetric
8.	Venation	Multicostate reticular diverging type
9.	Texture	Fibrous
10	Type	Simple
11.	Orientation	Coriaceous
12.	Surface	Upper surface glabrate and lower surface hispid

Figure 1: ***Coccinia grandis*** **leaves**

3.2 Microscopy: Transverse segment flowing through the midrib protrudes at the lower side and is flat at the upper side, according to a microscopical investigation. Straight walls were seen in the upper and bottom layers of the single-layered epidermis. Thick cuticle covering the epidermis had a few small glandular trichomes. The xylem and phloem vessels were found between single-layered palisade cells and spongy mesophyll cells under the top epidermis. The phloem and xylem are grouped in a ring. Phloem rings encircle the Xylem ring, which is located nearer the centre. One to three layers of highly developed collenchymatous cells were present on the lower side, and a small collenchymatous patch was located beneath the upper epidermis. Vascular bundles were semicircular, with three bicollateral, radially oriented vessels; the central vessel was

larger than the other two, which were placed beneath the upper epidermis.

The petiole's transverse section reveals a single-layered epidermis made up of elongated, flattened cells covered with cuticle. Two to six layers of round, thin-walled, chlorenchymatous cells with intracellular gaps and five layers of collenchymatous cells were seen beneath the epidermis. Single-ring-shaped bicollateral vascular bundles were present. One or two layered, thick walled, lignified, polygonal pericyclic sclerenchymas capped some bundles. A very broad pith made up of big parenchymatous cells was seen in the middle.

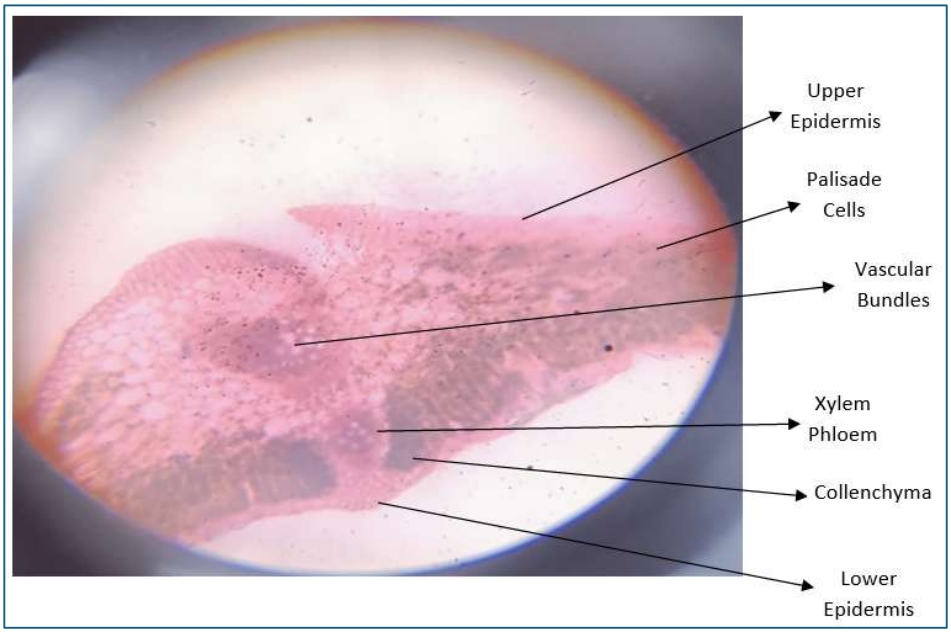

Figure 2: Microscopic study of *Coccinia grandis* leaves midrib with lamina

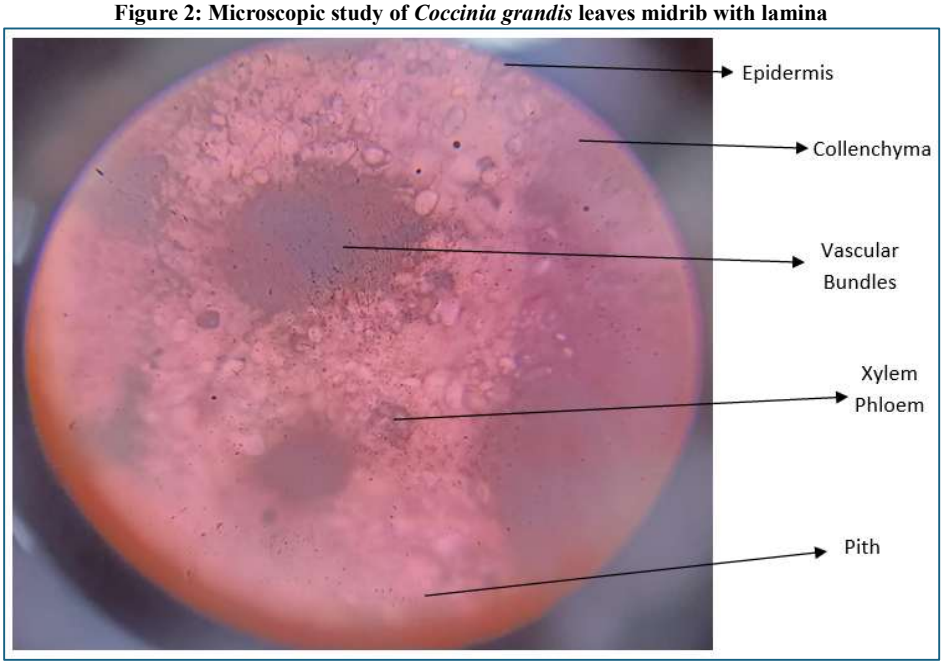

Figure 3: Microscopic study of *Coccinia grandis* leaves petiole

3.3 Physiochemical Evaluation: The primary criteria for evaluating the quality and purity of the medicine in powder form are physicochemical ones. The earthy matter or inorganic makeup of a medicine, as well as any other contaminants present, can be inferred from its ash readings. The main application of the extractive values is to identify medicine that has been contaminated or exhausted.

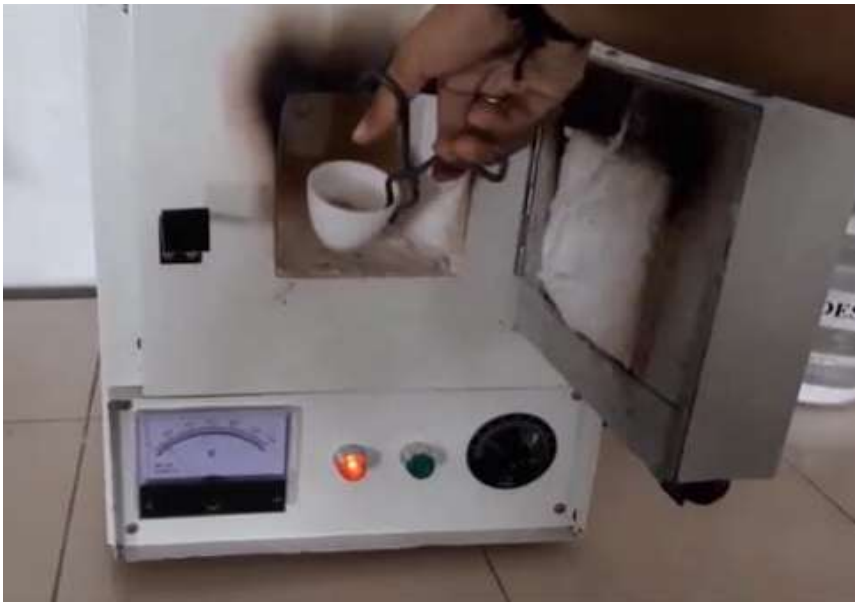

Figure 4: Loss on drying and Ash value of *Coccinia grandis* powder

Figure 5: Extractive value of *Coccinia grandis* powder

Table 2: Physiochemical Evaluation of *Coccinia grandis* Leaves powder

S. No.	Parameters	Values* expressed as %
1.	Loss on drying	9.03 ± 2.05
2.	Ash Value	
	Total ash	12.56 ± 1.37
	Acid soluble ash	1.43 ± 0.02
	Acid insoluble ash	9.78 ± 0.13
	Water soluble ash	4.63 ± 0.36
	Water insoluble	6.64 ± 0.83
3.	Extractive value	
	Water	21.47 ± 3.98
	Methanol	24.87 ± 5.98
	Ethanol	18.64 ± 3.98
	Petroleum ether	12.62 ± 2.72
	Chloroform	10.09 ± 5.98
	Ethyl Acetate	11.76 ± 3.87

N=3; Observation of Each

Table 2 shows that there was very little foreign organic materials in the crude material. The drying loss was determined to be 9.03 ± 2.05. The percentages of total ash, water-soluble ash, and insoluble ash were determined to be 4.63 ± 0.36 and 6.64 ± 0.83, respectively, and the percentages of acid soluble ash and insoluble ash were 1.43 ± 0.02 and 9.78 ± 0.13. Finding the locations where the powdered material was contaminated with sand and other inorganic material is made easier by calculating the ash values. The amount of inorganic material in the crude medication may be determined with the use of water-soluble ash, and the amount of sand and other debris can be determined with the use of acid-insoluble ash. It has been established what the varied extraction values are for various solvents. Methanol had the highest extractive value (24.87 ± 5.98), while water had the lowest (21.47 ± 3.98). The extractive was measured at 18.64 ± 3.98 in petroleum ether and 12.62 ± 2.72 in ethanol. Chloroform and ethyl acetate were found to have extractive values of 10.09 ± 5.98 and 11.76 ± 3.87, respectively. The extractive values aid in determining the best solvent to utilise in order to extract the maximum active principle and in determining whether or not the crude material has reached its limit.

4. CONCLUSION

"Pharmacognostic study of the leaves of *Coccinia grandis*" is the current study's title, and it centres on a plant that is widely accessible throughout India and has long been used to cure a variety of illnesses. Research on the plant *Coccinia grandis* is currently inadequate. Therefore, in order to take advantage of this potential, the current study examined the plant's leaves using a precise scientific technique. Modern drug identification and authentication depend heavily on the standardisation of crude pharmaceuticals. However, the relevance fell short of expectations because of a few issues. The outcomes of various

pharmacognostic analyses, including determination of extractive values, physical constant values, and macroscopic and microscopic examinations, will be useful in the future for accurately identifying *Coccinia grandis* in its intact or powdered form.

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6. CONFLICT OF INTEREST

There is no conflict of interest.

7. REFERENCES

[1] Kumar S, Paul S, Walia YK, Kumar A, Singhal P. Therapeutic Potential of Medicinal Plants: A Review. J Biol. Chem. Chron. 2015; 1(1): 46-54.

[2] Munasinghe MAAK, Abeysena C, Yaddehige IS, Vidanapathirana T, Piyumal KPB. Blood Sugar Lowering Effect of *Coccinia grandis* (L.) J. Voigt: Path for a New Drug for Diabetes Mellitus. Experimental Diabetes Research 2011; 2011, Article ID 978762, 4p.

[3] Bijauliya RK, Jain SK, Alok S, Dixit VK, Singh VK and Singh M: Macroscopical, microscopical and physico-chemical studies on leaves of Dalbergia sissoo Linn. (Fabaceae). Int J Pharm Sci Res 2017; 8(4): 1865-73.doi: 10.13040/IJPSR.0975-8232.8(4).1865-73.

[4] Tajuddin, S., N. Mat, A. G. Yunus and S. Bahri. Anatomical Study of Stem, Petiole, Leaf, Tuber, Root and Flower of *Dioscorea hispida* Dennst. (Dioscoreaceae) by Using Optical Microscope, SEM and TEM. J. Agrobiotech. 2013; 4: 32–41.

[5] Mazumbder PM, Sasamal D, Nambi RA. Antiulcerogenic and antioxidant effects of *Coccinia grandis* (Linn.) Voigt leaves on aspirin induced gastric ulcer in rats. Natural Product Radiance. 2008; 7(1): 15-18.

[6] Nautiyal R, Chaubey S, Singh R, Verma S. A critical review on Bimbi W.S.R. to its medicinal uses and pharmacological activity. EJBPS. 2018; 5(8):181-185.

[7] Njerua SN, Matasyoh J, Mwaniki CG, Mwendia CM, Kobia GK. A Review of some Phytochemicals commonly found in Medicinal Plants. International Journal of Medicinal plants Photon. 2013; 105:135-140.

[8] Gopalkrishnan V. Antihepatotoxic activity of *Coccinia indica* Ancient Sci Life, 2001; 21(1): 12-15.

[9] Pekamwar SS, Kalyankar TM, Kokate SS. Pharmacological activities of *Coccinia grandis* - a review. J App. Pharm. Sci. 2013; 3(05):114-119.

[10] Tiwari P, Kumar K, Kaur G and Kaur H. Phytochemical screening and extraction: A review. Int. Pharmaceut. Sci., 2011; 1(1): 34-44.

[11] Vadivu R, *et al*. Evaluation of hepatoprotective activity of the fruits of *Coccinia grandis* linn. International J of Health Res, 2008; (3): 163-168.

[12] Rao GMM *et al*. Hepatoprotective effect of *Coccinia indica* against CCl_4 induced hepatotoxicity. Nat. Pro. Sci. 2003; 9(1): 13-17.

[13] Shivhare Y, Soni P, Singh P, Dangi S, Baghel S. Evaluation of Anthelmintic Activity of *Coccinia indica* (fruits). J. Chem. Pharm. Res., 2011; 3(1): 488-491.

[14] Dhanabal SP, Kokate CK, Ramanathan M, Elango K and Suresh B. The hypoglycemic activity of *Coccinia indica* Wight & Arn. and its influence on certain biochemical parameters. Indian J Pharmacol. 2004; 36(4): 244-250.

[15] Mandal SC, Pal D, Maity S, Pal TK, Saha BP. Pharmacognostic Profiles of *Azadirachta indica* Jurs. Leaves. Ancient Science of Life. 1999; 3(4):118-122.

[16] Mukherjee PK, Quality control of herbal drugs, Business Horizon's, Pharmaceutical publisher, New Delhi, 2002: 138-141.

[17] Kirtikar KR and Basu BD. Indian Medicinal Plants, International Book Distributor, Dehradun, India. Edition 2nd, 2021.

[18] Chopra RN, Chopra IC, Handa KL, Kapur LD. Indigenous Drugs of India. Academic Publisher, Calcutta, India. Edition 2nd.

[19] Raghunathan K, Mitra R. Pharmacognosy of Indigenous Drugs, Vol -I & II, Central Council for Research in Ayurveda & Siddha, New Delhi, India.

[20] Shivaji PG, Chandrasekhar Rao MV. Antihepatotoxic activities of Ci compound ß sitosterol isolated from fruits and leaves of *Coccinia indica*. Indian J Pharm Educ Res 2012; 46(1): 7-11.

[21] Shakya VK. Antidiabetic activity of *Coccinia indica* in streptozotocin induced diabetic rats. Asian J Chem 2008; 20(8): 6479-6482.

[22] Mallick C, Mandal S, Barik B, Bhattacharya A, Ghosh D. Protection of testicular dysfunctions by MTEC, a formulated herbal drug, in streptozotocin induced diabetic rat. Biol Pharm Bull 2007; 30(1): 84-90.

[23] Gunjan M, Jana GK, Jha AK, Mishra U. Pharmacognostic and antihyperglycemic study of *Coccinia indica*. Int J Phytomed 2010; 2: 36-40.

[24] Arshad H, Shadma W, Iffat Z, Hussain MDS. Antibacterial activity of the leaves of *Coccinia indica* (W. and A) W of India. Adv Biol Res 2010; 4(5): 241-248.

[25] Bambal VC, Wyawahare NS, Turaska AO, Deshmukh TA. Evaluation of wound healing activity of herbal gel containing the fruit extracts of *Coccinia indica* Wight & Arn. (Cucurbitaceae). Int J Pharm Pharm Sci 2011; 3(4): 319-324.