

Research Article

Preliminary Physico-Phytochemical and Phyto-Cognostical Evaluation of the Leaves of *Calotropis gigantea(L.)R. BR*

Samanta Krishanu* and Mishra Divyansh

Pharmacy College, Itaura, Chandeshwar, Azamgarh 276128, Uttar Pradesh, India.

ABSTRACT

calotropis gigantea(L.)R. Br (Family- Apocyanaceae) and has great medicinal importance like to treat fever, rheumatism, indigestion, cold, eczema, diarrhea, cardio tonic, purgative, expectorant, scabies, ring worm, asthma, dropsy, painful joint swelling, pain killing, infected disease, induce abortion, cold etc. In present study deals with the characterization of morphological features, determination of physical constant such as the total ash value, acid insoluble ash value and water soluble ash value were 4.85%, 1.81%, 1.67% respectively. Loss of weight drying was 14%, foaming index >100, swelling index were 1.6cm., the percent yield for petroleum ether 2.75%, acetone 1.5%, chloroform 3.25%, methanol 13.5%, and aqueous 15.25 %.

Keywords: *calotropis gigantea(L.)R.Br*, Apocyanaceae, Cardiac glycosides, tannins, flavonoids.

INTRODUCTION

Herbal plants are effective source of traditional & modern medicines, useful for primary health care. Diseases and their treatment now a day's herbal medicine is important part of ancient plant worldwide. This helps to getting increase knowledge of medicinal plants. No proper report was found regarding and preliminary physico-phytochemical phyto-cognostical evaluation of *calotropis gigantea(L.)R.Br* till the date. Keeping this view a Preliminary physico-phytochemical phyto-cognostical evaluation of the leaves parts of *calotropis gigantea(L.)R.Br* under the family asclepiadaceae (Apocyanaceae). It is commonly known as the swallow-wort or milk weed^{1,4,5} madar(Hindi)^{2,3}, alarka(Sanskrit), akanda(Bengali), sodan apple, rooster tree^{4,5}, aak, arks, ushar, bomubomu, kayou etc. It is an evergreen, small to medium size, fast growth rate, upright, herbaceous, highly branched milk shrub, up to 3m hight, found through out India^{2,3}. *calotropis gigantea(L.)R.Br* is drought resistant, salt tolerant weed found along degraded roadsides, lagoon edges and waste land of india⁶. Leaves are opposite, nearly stalkless or sessile with broad light yellow mid vein. Barks are whitish, thick, fibrous, scaly, elipate-oblong, obovate-oblong, acute thick, deeply fissure & grove. When old change grey to light brown. Flower corolla are 5 petals, flowering time are much of year. Fruits is a follicle, kidney shape 2.7-4 inch long. Interior part is large tuft of white hairs. All part of the plant exude latex when cut or broken milky latex throughout.

It is used to treat fever, rheumatism, indigestion, cold, eczema, and diarrhea. Latex used as bitter, heating, oleaginous cardio tonic, purgative, expectorant, depilatory, scabies, ring worm of the scalp, asthma, dropsy, painful joint swelling, pain killing, infected disease, induce abortion, cold and controlling insect pests⁶, leucoderma, ulcers, tumour, leprosy, piles enlargement of spleen & liver⁷ etc. Stem are used for ropes, carpets, fishing nets, sewing thread.

calotropis gigantea(L.)R.Br have antimicrobial, cytostatic properties⁶, purgative, anthelmintic, analgesic, anticonvulsant, anxiolytic, sedative, antipyretic effect^{8,9}, bio-pesticides and future antibiotics²¹. It also have been reported to leaves part extract exhibit biological capabilities of antibacterial against E.coli, antimicrobial¹⁰, nematicide¹¹, wound healing activity^{12,20}, anti-inflammatory¹³, anti diarrheal¹⁴, hepatoprotective activity¹⁵, antipyretic⁹, anti arthritic activity¹⁶, hypoglycemic activity¹⁷, anti candida activity¹⁸, antiulcer activity¹⁹, anti oxidant²², antifungal agent, analgesic, against guinea worm, local anesthetics activities. Decoction of root bark is useful to syphilis, wound healing activity also root bark show insecticidal activity²³, antiasmatic activity²⁴. Latex show wound healing activity²⁵, vasodilation effect²⁶. Flower show antioxidant²², anti microbial activity²⁷. It is native in India to Sri Lanka, Iran to China, Malaysia, Indonesia, Indochina, Africa-Asia & most part of world with a warm climate in dry sandy, alkaline soil. In India it is found throughout plains and lower hills, usually near water growing up to an altitude of 900m including Andamans^{28,29}.

A preliminary study has reported the leaves extracts contains large numbers of bioactive secondary molecules like alkaloids, steroids, saponins, tannins, resins, reducing sugar. Latex contain hydrolytic enzyme, wax, terpenes, calactin, uscharidin, protease resin mudarine, cardiac glycoside (calotropin, uscharin, gigantol) calotropin³⁰, some poisonous constituent show caustic effect on the mucous membrane tender skin & dermatitis. The leaf contains ascorbic acid, ortho-pyrocatechic acid and also contains β -amyryl, taxasterol, tarasterol and beta-sitosterol [28]. standardization of herbal drugs are difficult because generally mixture of constituents and the active constituent in most cases is unknown. Now the present study deal the standardize leaves of *calotropis gigantea(L.)R.Br*

MATERIALS AND METHODS

leaves parts of *calotropis gigantea(L.)R.Br* were collected from fields of Sidhari, district of Azamgarh, Uttar Pradesh, India in the month of January and authenticated by Prof N.K Dubey, department of botany Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India. A voucher specimen has been preserved in Department of Pharmaceutical Chemistry, Pharmacy college Azamgarh, Uttar Pradesh, India for future reference (Voucher specimen no.march-2013-18). The aerial parts were dried under shade and powdered (40 mesh size) and stored in airtight containers.

The macroscopic characters were studied as per given procedure in WHO guidelines³¹

PHYSICO-CHEMICAL AND PHYTO-COGNOSTICAL STUDIES

The loss on drying^{32,33}, ash value (total ash, acid insoluble ash, water soluble ash)³⁴, foaming index³⁵, swelling index^{31,36}, fluorescence analysis³⁷⁻⁴¹, phytochemical screening⁴²⁻⁴⁴, microscopy⁴⁵⁻⁴⁶, extractive value (petroleum ether, acetone, chloroform, methanol and water) were determined according to the official methods of Ayurvedic Pharmacopoeia of India.^{32,47-49}

EXTRACTION METHOD

The powdered plant material was extracted with petroleum ether (40-60°C), acetone, chloroform, methanol, aqueous respectively in a series using a maceration process. The extracts were concentrated to dryness in vacuum individually to get petroleum ether extract (PECG), acetone (AECG), chloroform extract (CECG), methanol extract (MECG), aqueous extract (AECG) respectively. The yield of petroleum ether, acetone, chloroform,

methanol, aqueous extracts were 2.75, 1.5, 3.25, 13.5, 15.25% w/w respectively.

RESULT AND DISCUSSION

The macroscopical study of the leaves of *calotropis gigantea(L.)R.Br* was done. The leaves were light to deep green in opposite, entire, nearly stalkless, sessile, broad light yellow mid vein and main vein, also bitter in taste (Table-1). The values of the physical constant like ash values, loss on drying, extractive value were determined. Extractive value and color of extract was investigated (Table-2). Preliminary qualitative phytochemical screening shown that presence of alkaloids, glycoside, tannins, steroids, flavonoids and saponins (Table-3). Swelling index contain powdered drug 1.6 cm. Fluorescence nature of the powder drug & different solvent extracted drug with different chemicals was analyzed using short light wavelength and longer light wavelength and the observation were reported in table no-4 & 5. The height of the foam in every test tube was less than 1cm, the foaming index were less than 100 (table-6). The TS of *calotropis gigantea(L.)R.Br*. leaf showed the vascular strand is shallow, wide and bicollateral. The strand consist of several parallel rows of xylem element. Phloem occurs in small cluster all along the lower and upper part of xylem arc. Also powder microscopy showed calcium oxalate crystal.

CONCLUSION

Preliminary physico-phytochemical study of the *calotropis gigantea(L.)R.Br* study concluded to macroscopic, other physical values and parameters will help to identify the species of plant, phytochemical screening will help the presence of compounds, Microscopy is an important tool in the evaluation of crude drugs which is applicable at various levels such as the authentication of the crude drugs, study of powdered drugs, study of T.S., Calcium oxalate crystals, etc. which is responsible for the medicinal importance of the plant. *Calotropis gigantea(L.)R.Br* is known as wide range of medicinal value, it helps to identification, authentication and standardization. It also require to research on phytochemical and pharmacological aspect. However research going on it would be easier to develop new drugs.

ACKNOWLEDGEMENT

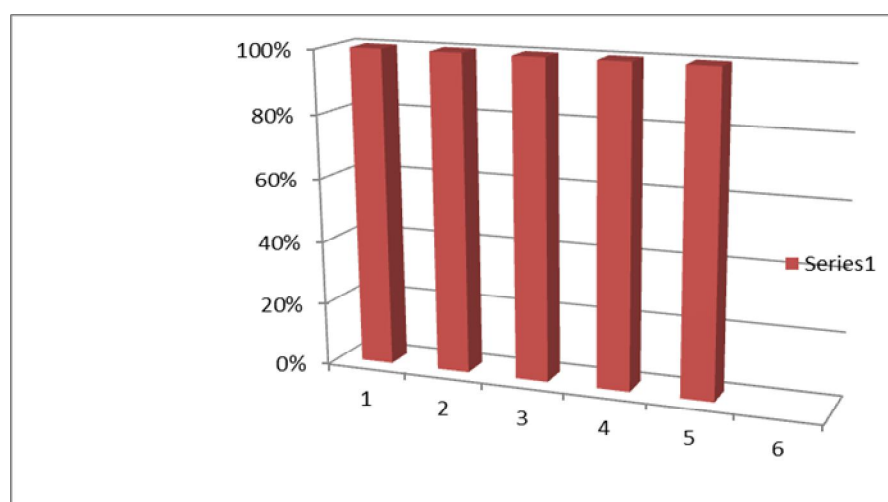
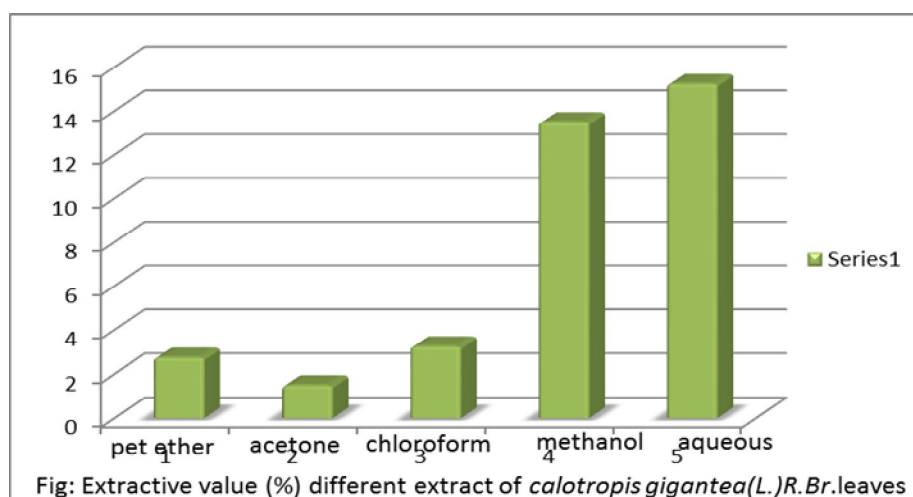
Authors sincerely thanks to Dr. Ashok Kumar, principal, Pharmacy College, Itaura, Chandeshwar, Azamgarh 276128, Uttar Pradesh.

Table 1: Macroscopical evaluation of *Calotropis gigantea(L.)R.Br.* leaves

S.NO	Feature	Observation
1	color	greenish
2	odour	characteristic
3	taste	bitter
4	shape	Opposite, entire, nearly stalkless, thick, Sessile, broad light yellow mid vein and main vein

Table 2: physicochemical analysis of *Calotropis gigantea(L.)R.Br.* leaves

S.NO	solvent	weight of plant material (gm)	percentage of yield(%)	colors of extract
1	pet. Ether	4	2.75%	Yellowish green
2	acetone	4	1.5%	light green
3	chloroform	4	3.25%	Dark green
4	methanol	4	13.5%	Dark green
5	aqueous	4	15.25%	Brown



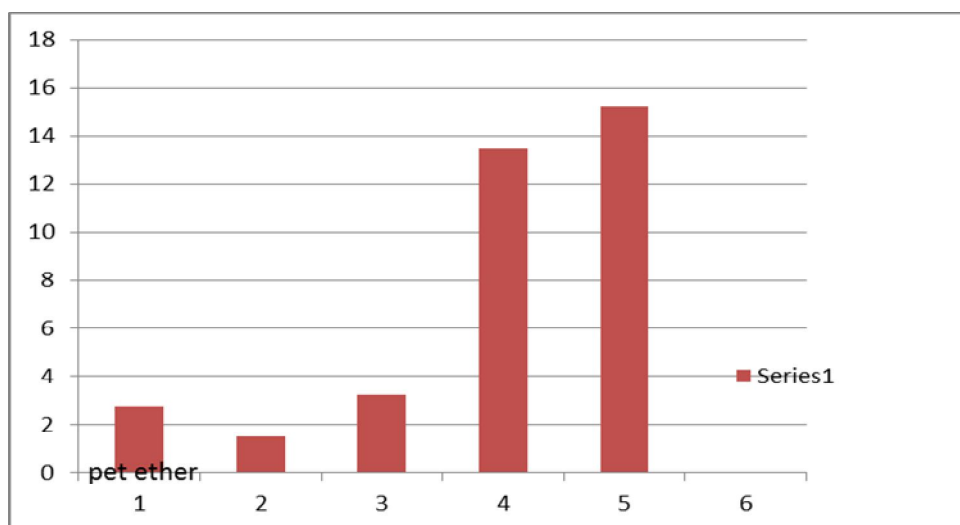


Table 3: phytochemical screening of *Calotropis gigantea(L.)R.Br.* leaves

S. No.	Test	pet. ether extract	acetone extract	chloroform extract	methanol extract	aqueous extract
1.	Alkaloids	+	+	+	+	+
2.	Cardiac glycosides	-	+	+	+	+
3.	Tannins	+	+	+	+	+
4.	Steroids	-	-	-	+	+
5.	Flavonoids	-	+	-	+	+
6.	Saponins	-	-	-	+	+

(+)- present, (-)-absent

Table 4: Fluorescence Analysis of *Calotropis gigantea(L.)R.Br.* leaves Powder

S.No	Treatment	Normal light	U.V. light (Short length)	U.V. light (long length)
1.	Powder + dil HCL	Green	Light Green	Black
2.	Powder +con HCL	Green	Light Green	Black
3.	Powder +dil H2SO4	Green	Light black	Black
4.	Powder +con H2SO4	Green	Light black	Black
5.	Powder + 10%KOH	Light Green	Green	Black
6.	Powder+ Fecl3	Green	Green	black
7.	Powder + dist H2O	Green	Green	Black
8..	Powder + Iodine	Yellowish Brown	Black	Dark Black

Table 5: Fluorescence Analysis of *calotropis gigantea(L.)R.Br* different.leaves Extract

S.No	extract	Normal light	U.V. light (Short length)	U.V. light (long length)
1.	Pet. ether	yellowish green	Yellowish green	Black
2.	Chloroform	Dark Green	Dark Green	Black
3.	Acetone	Light green	Greenish Yellow	Reddish brown
4.	Methanol	Dark green	Yellowish Green	Black
5.	aqueous	brown	Yellowish Green	Black

**Table 6: foaming index of
Calotropis gigantea (L.)R.Br different.leaves Extract**

Treatment	sample number of the test tube									
	1	2	3	4	5	6	7	8	9	10
dilutions(drug extract + water)	1:9	2:8	3:7	4:6	5:5	6:4	7:3	8:2	9:1	10:0
height of foam(cm)	0.05	0.1	0.1	0.3	0.1	0.3	0.3	0.2	0.3	0.3

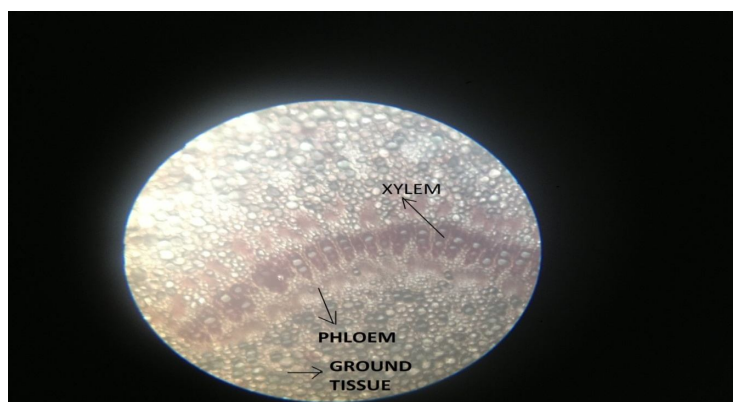
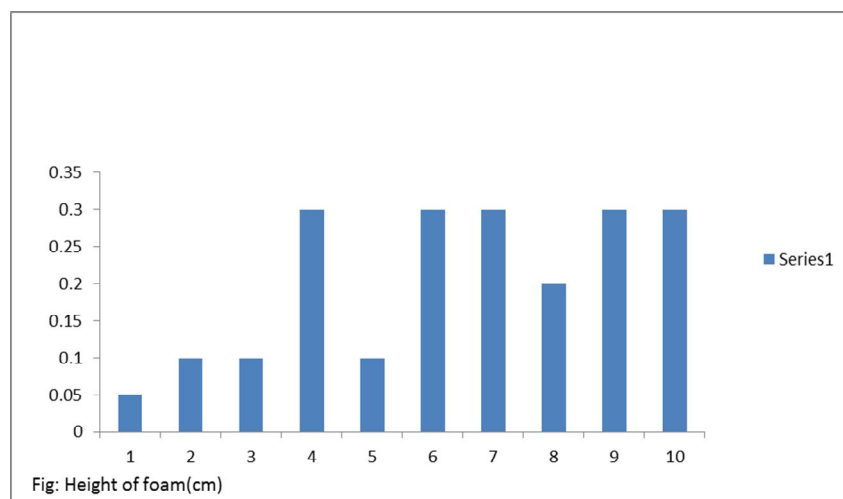
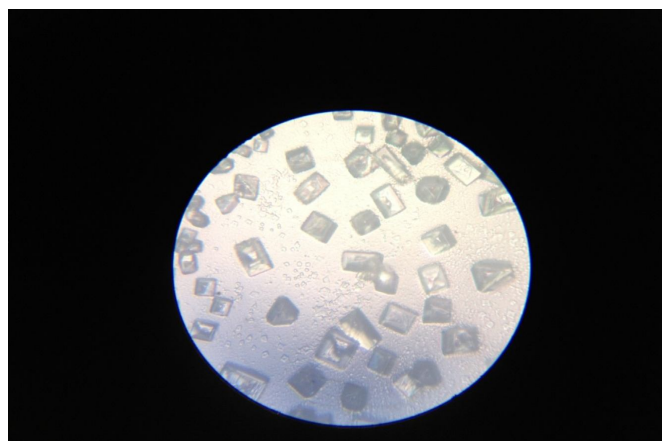


Fig: Microscopy of *Calotropis gigantea*(L.)R.Br.leaf



**Fig: Powder microscopy of
Calotropis gigantea(L.)R.Br leaves**

REFERENCES

1. Calotropis gigantea flowers(crown flower) with a bud :wikepedia, the free encyclopedia.
2. Kirtikar KR and Basu BD: Indian Medicinal Plants. Edition 2 International Book Distributors and Publishers, Dehradun, India, Vol. 1, 2008: 1607-1609.
3. Nadkarni KM and Nadkarni AK: Indian Materia Medica. Edition 3, Popular Prakashan Pvt. Ltd, Vol. 1, 1976: 237-241
4. Burkill H M ,The useful plants of west tropical Africa, Edition 2,vol.1, Royal botanical garden kew (1985)
5. Rahaman M A ,Wilcock C C, A taxonomic revision of calotropis asclepiadaceae, Nordiac Journal of Botany,11(3)1991,301-308.
6. Ambika A,Selvisabhanayakam, Histopathological effect of calotropis gigantea latex on seminal vesicle of odontopus varicornis(Heteroptera:Pyrrhocoridae), International Journal of Research in Biological Sciences2(4)2012,161-164.
7. Kartikar KR,Basu B D,Indian medicinal plants, Edition 2,Allahabad,India,Vol. 3,1994,pp 1606-1609.
8. Argal A, Pathak A K,CNS activity of calotropis gigantea roots, J Ethnopharmacol 106(1)2006,142-145.
9. Chitme H R, Chand R, Kaushik S,Evaluation of antipyretic activity of calotropis gigantea(Asclepiadaceae)in experimental animals, Phytotherapy research, 19(5), 2005, 454-456.
10. Bambawale OM, Mohan P and Chakraborty M: Efficacy of some medicinal plants against cotton pathogens. Adv Plant Sci 1995;8: 224-229.
11. Chattopadhyay RR: Nematicidal properties of some plant infested with Meloigyne incognita. Geobios 1991; 18: 232-236.
12. Deshmukh PT, Fernandes J and Atul A: Wound healing activity of Calotropis gigantea root bark in rats. J Ethnopharmacol, 2009; 17, 125 (1): 178-81.
13. Adak M and Gupta JK: Evaluation of anti-inflammatory activity of Calotropis gigantea in various biological systems. Nepal Med Coll J 2006; 8(3): 156- 61.
14. Chitme HR, Chandra M, Kaushik S: Anti-diarrhoeal activity of Calotropis gigantea R.Br.in experimental animals. J Pharm Sci,2004; 7(1): 70-5.
15. Lodhi G, Singh HK, Pant KK and Hussain Z: Hepatoprotective effects of Calotropis gigantea extract against carbon tetrachloride induced liver injury in rats. Acta Pharm 2009;59(1): 89-96.
16. Patil KS, Mamatha GC and Chaturvedi SC: Anti-arthritis activity of leaves of Calotropis gigantea Linn. Journal of Natural Remedies 2007; 7(2): 189 – 194.
17. Rathod NR, Chitme HR, Irchhaiya R, Chandra R: Hypoglycemic Effect of Calotropis gigantea Linn. Leaves and Flowers in Streptozotocin-Induced Diabetic Rats. Oman Med J 2011; 26(2): 104-108.
18. Gaurav Kumar, Loganathan Karthik and Kokati Venkata Bhaskara Rao: In vitro anti-candida activity of Calotropis gigantea. Journal of Pharmacy research 2010; 3(3): 539-542.
19. P. Swapna, Robertson S., Elumalai A , Eswaraiah M C, Nirmala K. Evaluation of antiulcer activity of calotropis gigantea r.br leaves,IJPSR,2011,2(11)2938-2941.
20. Suresh babu AR, Karki SS,wound healing activity of calotropis gigantea leaves in albino wistar rats, int j pharm 2012; 2(1): 195-199
21. David M, Bharath KR, Bhavani M,Study of calotropis gigantea R.Br extracts on Growth and Survival Dynamics of selected Pathogenic Microorganism, International Journal of Biological Engineering, 2011,1(1)1-5.
22. Usmani S, screening for antioxidant and free radical scavenging potential of extracts of leaves and flowers of calotropis gigantea, Asian Journal of Pharmaceutical and Clinical Research,2013,6(2)97-100.
23. Ashraf AM, Rawshanul H M, Nikkon J F, Khalequzzaman M, Rezaul KM,Root bark show insecticidal activity against tribolium castaneum(Herbst), World Journal of Zoology,2009,4(2)90-95.
24. Mayee R, Thosar A, Kondapure A, Evaluation of Antiasthmatic activity of calotropis gigantea roots, Asian Journal of Pharmaceutical and Clinical Research,2011,4(2),33-35.
25. Nalwaya N, pokharna G, Deb L, jain NK, Wound healing activity of latex of

- calotropis gigantea, International Journal of Pharmacy and Pharmaceutical Sciences, 2009, 1 (1), 176-181.
26. Sheelaa B, Hussain MS, Kumar PS, Kalaichelvam VK, Venkatachalam VK, Vasodilatation Effect of Latex from Calotropis gigantea in Green Frog Rana hexadactyla, Asian Journal of Medical Sciences, 2010 2(1): 22-24
 27. Patil S.M, Saini R, Antimicrobial activity of flower extract of Calotropis gigantea, Int.J.pharm.Phytopharmacol, Res. 2012, 1(4) 142-145.
 28. "Anonymous" (1998), The wealth of India, published by National Institute of Scientific and Industrial Research, New Delhi, India, 3, 78-84.
 29. Kirtikar K, Basu B. D. (2001), Oriental enterprises, 7, 2218-2221.
 30. Chaudhuri RHN: Pharmacognostic studies on the roots of Calotropis gigantea R.Br.ex Ait. Bull Bot Surv India 1961; 3: 171-173.
 31. A World Health Organization, Geneva; Quality Control Method for Medicinal Plant Materials, A.I.T.B.S. Publisher and Distributors., New Delhi, 2002; 8-24.
 32. Pharmacopoeia of India, Ministry of Health and family Welfare, Govt of India, New Delhi, Vol-II, 1996, A-53, 54, 89, 95.
 33. The Ayurvedic Pharmacopoeia of India, part-I, Vol-III 1st edition Ministry of Health and family Welfare, Govt of India, Dept of Health, New Delhi, 2001, 234-235.
 34. Bhatia D, Gupta M. K, Gupta A. M and Kaithwas J. Nat Pro Rad 2008; 7: 326.
 35. World Health Organization, Quality Control Method for Medicinal Plant, England, 1998, 28, 30, 46, 76.
 36. Wallis T. E, textbook of pharmacognosy 5th edition CBS publishers and distributors, New Delhi, India, 2005.
 37. Weltering E. J & Van Doon W. G : role of ethylene in senescence of petals morphological & taxonomical relationship journal of experimental botany 1988, 39, 1605-1616.
 38. Kashi A.R, Ramachandran S, & Sukumaran B. industrial pharmacognosy, university press, 2012, 25
 39. Indian Pharmacopoeia, publication and information directorate New Delhi, A-54, 89.
 40. Kokate C.K. practical pharmacognosy 1st edition, Vallabh prakashan New Delhi, 1986.
 41. Chase C.R and Pratt R.S, fluorescence of powdered vegetable drugs with particular reference to development of a system of identification, journal of American pharmacology association, 1949 38, 32
 42. Khandelwal K.R, practical pharmacognosy technique & experiments, ninth edition, Nirali prakashan, 2002, 149-156.
 43. Trease and Evans W.C pharmacognosy, 15th edition, 2005, 253-254.
 44. Mukherjee P.K, quality control of herbal drugs, 1st edition, 2002, 247-378.
 45. Wallis T. E, textbook of pharmacognosy 5th edition CBS publishers and distributors, New Delhi, India, 1985, 234-236.
 46. Khandelwal K.R, practical pharmacognosy technique & experiments, ninth edition, Nirali prakashan, 2002, 82-97.
 47. The Ayurvedic Pharmacopoeia of India, Part-1, Vol:II, (Govt. of India, Ministry of Health and Family Welfare), New Delhi.
 48. India Pharmacopoeia, controller of publication, Delhi, Vol-I, 1996, 209-210.
 49. World Health Organization, Geneva; Quality Control Method for Medicinal Plant Materials, Geneva, 1998, 9, 22-24, 33.