Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
https://www.phytojournal.com
JPP 2023; 12(5): 251-255
Received: 01-07-2023
Accepted: 03-08-2023

Sunil B Yarazari
PG, Department of Botany, Karnatak University, Dharwad, Karnataka, India

M Jayaraj
PG, Department of Botany, Karnatak University, Dharwad, Karnataka, India

Corresponding Author:
Sunil B Yarazari
PG, Department of Botany, Karnatak University, Dharwad, Karnataka, India

Pharmacognostic studies of flowers of *Calycopteris floribunda* Lam. A multi potent medicinal plant

Sunil B Yarazari and M Jayaraj

DOI: https://dx.doi.org/10.22271/phyto.2023.v12.i5c.14732

Abstract
Calycopteris floribunda Lam. is commonly known as paper flower climber endemic to south Asian countries. It is used for the treatment of diarrhea, jaundice, malaria, wound healing, ulcers and snake bites. The previous studies on *C. floribunda* showed that the plant has anthelmintic, antimicrobial, antioxidant, anti-inflammatory, Hepatoprotectivity and anticancerous activity. Even though, plant has significant medicinal value there are no reports available on the pharmacognostic standardization of the characters of the plant. Hence the present work is undertaken to standardize the pharmacognostic parameters. In this work pharmacognostic study of flowers is done which includes macroscopic, organoleptic study, powder microscopy, physico-chemical characterization (ash values, loss of moisture, foaming index, pH and extractive yields) and fluorescence analysis of flower powder. The present work is provided the valuable information regarding the standardized of pharmacognostic parameters of flowers of *C. floribunda*, which can be used for identification, authentication and the quality of the crude drugs for the further studies.

Keywords: *Calycopteris floribunda* Lam, crude drug, fluorescence, oragnoleptic, pharmacognostic, physico-chemical

Introduction
Medicinal plants play important role in the maintaining health of human beings in every traditional practice, according to the W.H.O 80% of population of the world depends upon the traditional medicine and major part of this traditional medicinal use of plants and their products as ingredients [1]. Bioactive substances present in plants are having various therapeutic uses and used in production of drugs. Most of the drugs produced my modern pharmacopeia are either herbal or chemicals are extracted from plants [2]. Secondary metabolites derived from medicinal plants are used as antimicrobial, antibiofilm agents and as source of antioxidants for various diseases [3].
Calycopteris floribunda Lam. commonly known as Paper flower climber (English) is a evergreen liana belongs to Combretaceae. It is endemic to Asian tropic mountains and used in Asian traditional medicinal practices like Ayurveda, Unani and folk. Stem and leaves are used in the treatment of fever, dysentery and preparation of roboran tonic [4]. Stem sap is used to treat indigestion; leaves are mixed with the leaves of *Jasminum malabaricum* to soothe asthmatic attack [5]. Stem and root extracts are used to treat infertile woman [6]. Methanolic and chloroform stem extracts of *C. floribunda* are reported to have anti-inflammatory [7] and hepatoprotective activities [8].
Even though, the *Calycopteris floribunda* Lam. has gained its place in traditional medicinnal practices of south Asia countries and GC-MS analysis has showed important phytochemicals [9], there are no detailed information available regarding its pharmacognostic parameters of the flowers. Hence, the present work has been attempted to provide the reliable pharmacognostic data to assess the quality of the drug and to check the adulteration of the same plant or different plants.

Materials and Method
Plant material
The healthy plant samples were collected from the Karnatak University campus, Dharwad (15° 43′ 74.98" N, 74° 98′ 36.86′ E), Karnataka. India. The collected plant samples (Fig 1) were identified by one of the authors referring Flora of the Presidency of Bombay [10] and Herbarium specimen with voucher number KUD/BOT/SY/MJ/01 deposited in the P. G. department of Botany, Karnatak University, Dharwad, Karnataka, India. The collected flowers were shade dried at room temperature for 10 to 20 days.

Further, it was powdered using electric grinder and stored in air tight zipper bag for further use.

Fig 1: Flowers of *Calycopteris floribunda* Lam.

Macroscopic study
The flowers of *C. floribunda* were studied for its morphological characters using standard techniques [10].

Organoleptic evaluation
The powdered drugs are used to study organoleptic parameters like color, odor, taste, shape and texture by following standardized methods [11, 12].

Powder microscopy
Microscopy of powdered flowers was carried out following the standard procedure. Small quantity of powder is taken on slide and mixed with Phloroglucinol: HCl (1:1). Then the mixture was spread on the slide uniformly and mounted with glycerine and observed under the microscope [13].

Physico-chemical study: Different physico-chemical parameters like ash value, moisture content, fat content, foaming index, pH and extractive values of flower powder was studied by following standard procedures [14].

Fluorescence analysis
Flower powder is mixed with various reagents and observed under UV light at different wave lengths following standard procedures [13, 14].

Results
Macroscopic study
The flowers of *C. floribunda* are yellowish green and are densely arranged at the end of the branches forming large panicles. Flowers are sessile, actinomorphic, bisexual and epigynous. The calyx has 5 sepals elongates into tube and persistent, measuring 2.3 – 2.6 cm in length. Androecium consists of 10 stamens, biseriate, subulate filament and didymous. The gynoecium is monocarpellary and monolocular ovary with pendulous ovule.

Organoleptic study
The flower powder is yellowish green in colour, has pleasant odour and bitter in taste (Table 1).

Table 1: Organoleptic study of flower powders of *Calycopteris floribunda* Lam.

Characters	Flower
Colour	Yellowish green
Odour	Pleasant
Taste	Bitter
Texture	Smooth

Powder microscopy
Flower powder microscopy
The flower powder is yellowish green and has pleasant smell. The powder microscopy of flower showed the presence of trichomes, epidermal tissue, parenchyma tissue, prismatic calcium crystals, cluster crystals and glandular and non-glandular scales (Fig 2).

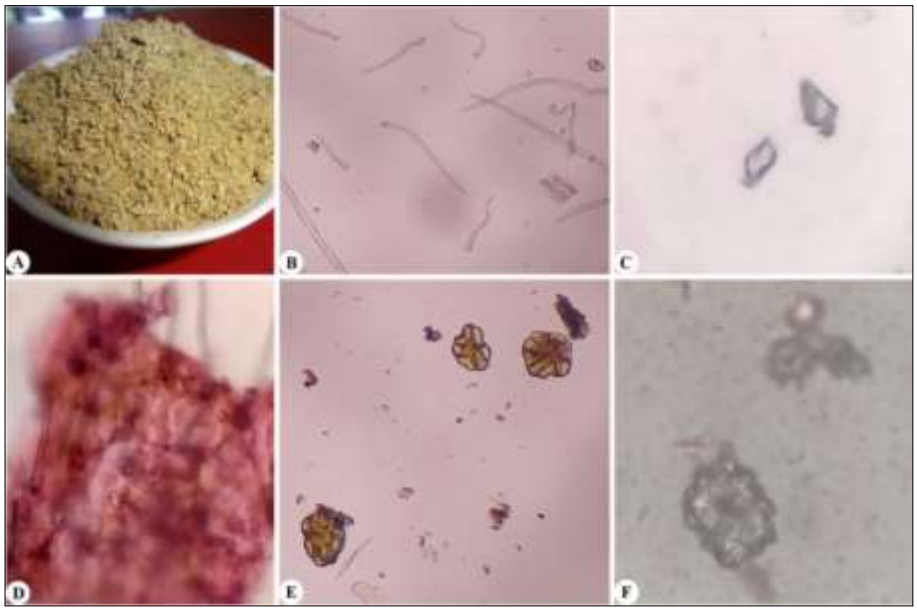

Fig 2: Flower Powder microscopy of *Calycopteris floribunda* Lam. A) Flower powder, B) Trichomes C) Prismatic calcium crystal, D) Epidermis with trichomes, E) Glands and F) Cluster crystals.

Physico-chemical characters
The flowers of powder is analyzed for different physico-chemical characters such as total ash value, acid insoluble ash value, water insoluble ash value, loss of moisture on drying, foaming index, pH at 1% and 10% and extractive yield presented in Table 2 and 3.

Table 2: Physico-chemical parameters of flower of *Calycopteris floribunda* Lam.

Parameters	Flower
Total ash (%)	6.713±0.126
Acid insoluble ash (%)	0.323±0.049
Water insoluble ash (%)	2.476±0.440
Loss on drying (%)	6.236±0.330
Foaming index	Less than100
pH (1%)	4.30±0.035
pH (10%)	4.08±0.036

Result expressed as mean ± SD of n = 3

Table 3: Extractive yield (%) of flowers of *C. floribunda* Lam.

Plant parts	Solvents	Cold extraction	Hot extraction	Successive extraction
Flower	Petroleum ether	0.520±0.105	1.673±0.037	1.670±0.081
	Chloroform	1.403±0.025	7.233±0.611	2.026±0.125
	Acetone	3.533±0.155	13.666±0.202	2.546±0.047
	Alcohol	5.190±0.219	21.003±0.155	5.706±0.200
	Water	2.670±0.070	28.043±0.150	5.643±0.126

Result expressed as mean ± SD of n = 3

Fluorescent analysis

Flower powder of *C. floribunda* was treated with various reagents like methanol, petroleum ether, acetone, chloroform, 50% H_2SO_4, 50% HNO_3, 50% HCl, 10% NaOH, ammonia and glacial acetic acid. After the treatment the powder was observed under visible and UV light (254 nm and 365 nm) (Table 4).

Table 4: Fluorescence analysis of flower powder of *Calycopteris floribunda* Lam.

Material with Chemical	Visible Light	UV Light at 254nm	UV Light at 365nm
Powder	Hazelnut colour	Brown	Hazelnut colour
Powder + Methanol	Pale Green	Green	Fluorescent Pink
Powder + Petroleum Ether	Straw colour	Fluorescent Green	Fluorescent Pink
Powder +Acetone	Pale Green	Light Brown	Fluorescent Pink
Powder +Chloroform	Brown	Fluorescent Green	Fluorescent Green
Powder + 50% H_2SO_4	Colourless	Olive Yellow colour	Olive Yellow colour
Powder + 50% HNO_3	Dark Orange	Fluorescent Green	Dark Orange
Powder + 50% HCL	Colourless	Sand Colour	Fluorescent Green
Powder + 10% NaOH	Muddy Brown	Fluorescent Green	Dark Green
Powder + Ammonia	Cinnamon colour	Maroon	Cinnamon colour
Powder + Glacial acetic acid	Peanut colour	Fluorescent Green	Fluorescent Green

Discussion

Medicinal plants play major role in the traditional medicinal practices because of their easy availability, effectiveness and low cost. Even though there is advancement in the field of medicine, the developing countries are still use medicinal plants as basic source of health treatment [15]. The main problem in the use of traditional medicine is the absence of proof of documentation and low quality measures. Hence, there is need for the research work to carry out in the field of traditional medicine and to standardize the plant and its part for authentication. The standardization of the plants can be achieved by pharmacognostic and phytochemical studies. This helps to identify the quality and to test efficacy of drugs [16]. So, in this regard the present work has been carried out to standardize the pharmacognostic parameters of flowers of *C. floribunda*.

Macroscopic study of medicinal plants is the preliminary step in standardizing pharmacognostic parameters [15].In the present study of flowers of *C. floribunda* different macroscopic characters like colour, size, arrangement, androecium and gynoecium were studied. Similar study was reported by Gopalkrishnan and Chiranjeev (2018) [17] for flowers of *Ixora coccinea* L.

Powder microscopy of the plant material gives the reliable knowledge regarding the nature of the powdered drug, it involves the identification of cyto-morphological parameters like parenchyma cells, trichomes, xylem tissues, phloem tissues and cell inclusions like starch grains and calcium oxalate crystals [14]. In the present study, the powder of flowers showed the characteristic structures like trichomes, lignified xylem and phloem tissues, prismatic crystal, cluster crystals and glandular scale. Nissar *et al*. (2021) reported similar structures in flower powder of *Dictamnus albus* L [14].

Physico-chemical study of plants gives the standard parameters for purity and quality of the drugs. The ash content of the drugs helps to determine the inorganic chemicals like oxides of Ca, Mg, K, Na, Si, P and Fe. These can be used as the parameter for purity and authentication [19]. In the present study the total ash value, acid insoluble ash value and water insoluble ash value of the flowers of *C. floribunda* was calculated, the results obtained showed that water soluble ash value is more compared to the acid insoluble ash value which indicated that powders have more organic contents. Das *et al.* (2019) [20] studied total ash content of *Dregea volubilis* (L.f.) Benth. Flowers showed that ash value of powder obtained and it is told assay the quality of the drugs.

Loss of moisture on drying is the one of the basic parameters used to determine the quality of the drug. Thus the minimum value of the moisture content of crude drug should be less than 14% to avoid any microbial contamination [18]. The loss of moisture on drying the powder was below 14%. Das *et al.*

(2019) [20] reported that moisture content of crude drug should be low for microbial decomposition and to increase the storage capacity of the drug.

The formation of foam by crude drug when dissolved in water is due to presence of the saponin, this foam formation is measured as foaming index and used as one the parameters for standardizing the quality of the drug [12, 14]. In the present study, the foaming index of flower is less than 100. Bisht *et al.* (2017) [21] reported similar study of foaming index in the flowers of *Saraca asoca* (Roxb.) Willd and stated that saponins present in plant material produce constant foam which can be used to measure foaming index of aqueous solution of plant drug.

The pH the drug gives the ionic nature of the drug; in the present study the pH value indicated that flower powder is more acidic. Prakash *et al*. (2019) [22] in their study on *Trianthema portulacastrum* L. showed that the biopharmaceutical characters of drug is depends on its acidic/basic property and they reported that the pH of plant based drugs should be within the range of 4.0-7.5 and in the present study on *C. floribunda* pH is 4.30 (1%) and 4.08 (10%) hence, it can be used as medicinal plant.

Extractive yield of the plant extracts are considered as the one of the important physico-chemical parameters for standardization for quality of the plant drugs, the extractive yield gives the information regarding the phyto-constituents of the extracts and in selection of the better suitable solvents for extraction of the crude drugs [23]. In the present work three types of extraction were carried out. The results obtained are showed that the flowers of the *C. floribunda* have more polar compounds compared to non-polar compounds. Syeda Nishat Fathima (2018) [24] in pharmacognostic assessment of *Lawsonia inermis* flowers they recorded similar results and reported that extractive values indicate the presence of phytochemical in the plant material and to use suitable solvents to obtain accurate results.

Fluorescence analysis is one of the important parameters in determining the quality and purity of the crude drugs; it depends upon the nature of chromophores present in the plant powder. When the crude drugs treated with certain chemical reagents, a characteristic fluorescence can be observed in visible light or under UV light due to presence of certain constituents in the plant material [15]. In the present study the powder of the flowers showed the characteristic fluorescence when treated with chemical reagents and observed under visible and UV light. Syed Waleed Ahmed Bokhari *et al.* (2022) [25] reported florescence analysis of *Cordia sebestena* L. flowers showed similar results which showed chromophores present in powdered drug are important parameter for standardization.

Conclusion

The present work is carried out to obtain pharmacognostic data which can be used to test the adulteration, identification and authentication of the drug. This study supports the use of the flowers as crude drug as it meets pharmacognostic parameters of crude drugs. This work can also be used to cross check the quality of the drug available in market or used by traditional healers and for the development of the data for monograph of the plant for the proper identification.

Acknowledgement

Authors thank the Chairman, PG department of studies in Botany, Karnatak University, Dharwad, University scientific and instrumentation center (USIC) Karnatak University, Dharwad and Backward classes welfare Department, Government of Karnatak for scholarship for one of the authors.

References

1. Tole TT, Diriba E, Bahiru LA. Bioactive compounds from *Croton macrostachyus* and *Commiphora abyssinica* occurring in Ethiopia. Advances in Traditional Medicine. 2021, 1-9.
2. Arya A, Kumar S, Paul R, Suryavanshi A, Kain D, Sahoo RN. Ethnopharmacological survey of indigenous medicinal plants of Palampur, Himachal Pradesh in north-western Himalaya, India. Advances in Traditional Medicine; c2021, 1-44.
3. Rajput M, Bithel N, Vijayakumar S. Antimicrobial, antibiofilm, antioxidant, anticancer, and phytochemical composition of the seed extract of *Pongamia pinnata*. Archives of Microbiology. 2021;203(7):4005-24.
4. Liu JJ, Yang DL, Zhang Y, Yuan Y, Cao FX, Zhao JM, *et al*. Chemical component and antimicrobial activity of volatile oil of *Calycopteris floribunda*. Journal of Central South University of Technology. 2009;16:931-5.
5. Bhandary MJ, Chandrashekar KR, Kaveriappa KM. Medical ethnobotany of the siddis of Uttara Kannada district, Karnataka, India. Journal of ethnopharmacology. 1995;47(3):149-58.
6. Suttaratrungse K, Chanhan P, Kanokmedhakul K, Moosophon P, Kanokmedhakul S. Two new flavonols from flowers of *Getonia floribunda* Roxb. Phytochemistry Letters. 2015;11:316-9.
7. Satyanarayana T, Eswaraiah MC, Bharathi A, Srinivas M. Anti–inflammatory activity of stem of *Calycopteris floribunda*. Journal of Pharmacy and Chemistry; c2009.
8. Eswaraiah MC, Satyanarayana T. Hepatoprotective activity of extracts from stem of *Calycopteris floribunda* Lam. against carbon tetrachloride induced toxicity in rats. International Journal of Pharmacognosy and Phytochemical Research. 2010;2(3):53-7.
9. Yarazari SB, Jayaraj M. GC–MS analysis of bioactive compounds of flower extracts of *Calycopteris floribunda* Lam.: A multi potent medicinal plant. Applied Biochemistry and Biotechnology. 2022;194(11):5083-99.
10. Cooke T. Flora of the Presidency of Bombay. 1903;1:481-482.
11. Arunkumar BS, Jayaraj M, Ankalikar AA. Pharmacognostical Investigation of *Ionidium suffruticosum* Ging. A Seasonal Multipotent Medicinal Herb. Pharmacognosy Journal. 2010, 2(10).
12. WHO Quality control methods for herbal materials. WHO Press, Geneva, Switzerland; c2011.
13. Banakar P, Jayaraj M. Pharmacognosy, phytochemistry and GC-MS analysis of ethanolic stem extract of *Waltheria indica* L.-A potent medicinal plant. Journal of Biologically Active Products from Nature. 2017 Sep 3;7(5):369-78.
14. Nissar S, Raja WY, Majid N, Nawchoo IA, Bhat ZA. Pharmacognostic characterization and development of quality control standards for *Dictamnus albus*: a comparative study of different parts. Advances in Traditional Medicine. 2021, 1-4.
15. Dash GK, Hashim MH, Hassan AK, Muthukumarasamy R. Pharmacognostic studies on the leaves of *Annona muricata* Linn. 2021, 13(1).

16. Prasanth DS, Rao AS, Yejella RP. Pharmacognostic and Preliminary Phytochemical Investigation of Leaves of *Aralia racemosa* L. Pharmacognosy Journal. 2016, 8(3).
17. Gopalkrishnan B, Chiranjeev R. Pharmacognostical study of *Ixora coccinea* flower. Pharmacognosy Journal. 2018, 10(5).
18. Majid N, Nissar S, Raja WY, Nawchoo IA, Bhat ZA. Pharmacognostic standardization of *Aralia cachemirica*: a comparative study. Future Journal of Pharmaceutical Sciences. 2021;7:1-8.
19. Papiya B, Sourabh V, Alok S, Chandra Shekhar SC. Pharmacognostic and Physico-chemical standardization of *Macrotyloma uniflorum* (Lam.) verdc. Edible seed. Phcog Commn. 2014;4(1):16-24.
20. Das BH, De AR, Das P, Nanda AM, Samanta AM. Pharmacognostic studies on flowers of *Dregea volubilis*: evaluation for authentication and standardization. Asian Journal of Pharmaceutical and Clinical Research. 2019;12:79-89.
21. Bisht A, Irshad S, Rawat AK, Dwivedi H. Pharmacognostical studies on *Saraca asoca* (Roxb.) Willd. flower. Tropical Plant Research. 2017;4(1):153-60.
22. Prakash A, Janmeda P, Pathak P, Bhatt S, Sharma V. Development and standardization of quality control parameters of different parts of *Trianthema portulacastrum* L. SN Applied Sciences. 2019;1:1-4.
23. Aslam I, Afridi MS. Pharmacognostic characterization of *Beaumontia grandiflora* (Roxb.) Wall. leaf for taxonomic identification for quality control of a drug. Journal of Applied Research on Medicinal and Aromatic Plants. 2018;8:53-9.
24. Fathima SN. Pharmacognostic assessment of *Lawsonia inermis* flowers. Journal of pharmacognosy and phytochemistry. 2018;7(6):2365-9.
25. Bokhari SW, Sharif H, Gilani SM, Ali ST, Ahmed S, Siddiqui MU, *et al*. Pharmacognostic and phytochemical study of the flowers of *Cordia sebestena* L. Pakistan Journal of Pharmaceutical Sciences. 2022, 35(1).