Pharmacognostic studies on *Cadaba fruticosa* (L.) druce leaves

P.Y. Bhogaonkar and V.N. Chavhan**

*Department of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati - 444 604 (M.S.), **Department of Botany, Arts, Commerce and Science College, Maregaon (Road) Dist. Yavatmal 445303 (M.S.)

Email: chavhanvinod8@gmail.com

Abstract

*Cadaba fruticosa* (L.) Druce is a commonly found plant in Vidarbha region (Maharashtra) and is medicinally important; leaves being used in rheumatism. The anatomical and phytochemical studies were carried out with respect to leaves. The present investigation showed the presence of alkaloids, simple phenolics, flavanol, flavones, flavonol, leucoanthocyanin, saponins and steroids. Ash analysis was also done to study the mineral content. Analysis was carried out to test the minerals like Sodium, Potassium, Calcium, Iron, Magnesium, Aluminum, Manganese, Copper, Nickel, Chromium and Zinc. The biochemical profile proves the medicinal value of the plant.

**Key words:** Pharmacognosy, Banjara Tribe, *Cadaba fruticosa*, phytochemical analysis and mineral Profile.

Introduction

*Cadaba fruticosa* (L.) Druce, is a commonly found plant in Vidarbha region (Maharashtra) and is medicinally important. *Cadaba fruticosa* (L.) It is woody and erect and glandular - pubescent shrubs, frequently found around field hedges. Leaves are used by Banjaras of Vidarbha in rheumatism (Bhogaonkar and Chavhan, 2013). It is also used in gastrointestinal, urine complaints and as vermicide (Jain, 1991). Roots and leaves are purgative, deobstructive, emmenagogue and aperient; used as poultice on sores (Chopra et al., 1996); decoction of leaves is given twice daily for a week to cure urine obstruction and to resume free flow of urination in tribal pockets of Northeast Gujrat (Punjani, 2010). Small stem pieces are put in coconut oil, kept over fire for half an hour for extracting and then slightly warmed oil used to massage joints in the Ahmadnagar area of Maharashtra (Gayake et al., 2012). Leaves are anti-diabetic (Arokiyaraj et al., 2008) and antipyretic (Mythreyi et al., 2008). It possesses anti-microbial activity (Selvamani and Latha, 2005). Leaf juice is used as eye drops by the ethnic people of Andhra Pradesh (Reddy et al., 2010). It is also used as an antidote against poisoning in Padukkotai District of Tamilnadu (Nandagopalan et al., 2011). Sankaranarayan et al. (2010) reported it as stimulant and anti-scorbutic. In the present work an attempt has been made to study the anatomical and phytochemical properties of the leaves *Cadaba fruticosa*.

Material and Methods

The plants were brought to a laboratory for identification and were processed for herbarium
specimens (Singh and Karthikeyan, 2000, Yadav and Sardesai, 2002). Pharmacognostic studies were carried out with respect to leaves. In the anatomical studies fresh hand cut sections were observed under the microscope. Microphotographs were taken with the help of a CCD camera. Detection of bioactive compounds was done by standard methods (Evans, 1997; Gibbs, 1974; Gupta and Varshney, 1997; Sadasivam and Manickam, 2005). Responses to various tests were denoted by +, ++ and +++; indicating weak, moderate and strong reactions respectively. Plant ash was prepared and different ash values were calculated (Kulkarni and Apte, 2000). Quantitative estimation was done by Atomic Absorption Spectrophotometer.

Results and Discussion

Woody, erect, glandular-pubescent shrubs, 2-5 m tall. Leaves elliptic-oblong, 1-5.5 x 0.5- 3 cm, glabrous, obtuse, mucronate. Petiole 4 – 6.5 mm long. Flowers 2 – 2.5 cm; in terminal corymbs. Pedicels 1 – 2.5 cm long, pubescent; bracts subulate. Sepals ovate – oblong, 1.5 cm long, acute, pubescent outside. Petals white, oblanceolate – spathulate, as long as sepals. Disk funnel shaped, 1 cm long, expanded, toothed. Stamens 4 - 6, exerted. Gynophore 2 - 2.5 cm long. Fruit cylindric, torulose, 2 – 5 cm long, pubescent. Seeds many, brown, surrounded by orange-red aril. Fls. and Frts.– November to March.

Anatomy

Node : Node unilacunar, single trace.

Petiole : Petiole cylindrical. The trace enters petiole base as ‘C’ shaped arc whose arms are very close. Higher above, only in the base, these arms incurve and meet each other (Fig. -1; Plate – 1 ). Later the ends of the arm get detached from the main vasculature, get fused to each other and as a result a vascular trace enclosed within are is produced. Ends of arc remain separate by sclerenchyma. Higher above arms of asculature meet to form a ring around the central enclosed vascular bundle. At the same time central bundle develops fibrous sheath (Fig.-2; Plate - 1). Main vasculature surrounded by pericyclic sclerenchyma (Fig.-3; Plate - 1). Cortex paren- chymatous (Fig.-4; Plate - 1). Again at the base of lamina the medullary bundle divides into two. The traces are pushed on upper side and join the main cylinder which opens to form a ‘C’ shaped arc with incurved arms.

Lamina : Lamina amphistomatous; stomata anisocytic. Cells of upper epidermis shallowly sinuate with cuticle producing striations (Fig.-5; Plate -2). Cells of lower epidermis deeply sinuate, cuticular striations more prominent (Fig.-6 and 7; Plate – 2).

Mesophyll : Mesophyll mixed type. Palisade at places distinctly single layered; while, at places palisade cells are short, followed by a layer somewhat elongated, squarish, compactly placed cells, giving an appearance of two- three layered palisade or at places palisade is indistinct. Spongy tissue consisting of 4-5 layers of isodiametric thin-walled chlorophyllose cells; air chambers large and horizontally stretched (Fig.-8; Plate -2).

Midrib : Midrib with parenchymatous ground tissue. Vasculature in the form of 2 traces, placed abaxially and adaxially; the lower bundle is larger, accompanied by sclerenchymatous sheath on phloem as well as on xylem side. Two closely placed abaxial vascular bundles are inversely oriented with xylem abutting the sclerenchymatous sheath of larger bundle. Below upper epidermis zone of chlorenchyma present (Fig.- 9; Plate - 2).

Two types of peltate trichomes are present, a) Base unicellular, stalk uniseriate, head multicellular peltate. b) Base multicellular, bulbous, stalk uniseriate; head multicellular, peltate (Fig.- 10; Plate - 2).

Discussion and Conclusion

Little anatomical data is available for comparison. Findings of the present investigation are discussed in
the light of data given by Metcalfe and Chalke (1972). Peltate glandular trichomes found in *Cadaba fruticosa* are reported in species of *Cadaba* by earlier authors also. Emergences resembling hairs reported earlier in *Cadaba* species are absent from the present species. Trichomes with bulbous bases are reported for the first time. Capparidaceae are with anomocytic stomata, however, here anisocytic stomata are present. Both centric and dorsiventral mesophyll are reported in the family. In the present species palisade is either distinct, single layered or 2-3 layered or may be homogeneous. Such a varied type of mesophyll appears to be the characteristic feature of *C. fruticosa*. The transition in vascular architecture of the petiole is also an interesting feature. The petiole structure varies in Capparidaceae. Petiole architecture of *C. fruticosa* appears to be a combination of *Cadaba linniaris* and *Stereophoma elipticum*.

During the present investigation, the leaves were screened for the 16 bioactive molecules. The plant tissue was found to contain alkaloids (++), β-naphthol (++), flavanols (++), flavones (+), leucoanthocyanin (++), steroids (++), tannins (+) and saponins (++). Terpenoids and gum reported by Arokiyaraj et al. (2008) are found to be absent. Mythreyi et al. (2008) found aqueous and ethanol extract to be antipyretic.
and attributed this property to the flavonoids and steroids present. Arokiyaraj et al. (2008) proved C. fruticosa having anti-diabetic property, which may be due to the presence of flavonoids, terpenoids and steroids. Banjaras of Vidarbha region use this plant as anti-rheumatic; the activity can be attributed to anti-inflammatory effect of steroids found in the present material.

Minerals play several vital roles in maintaining body health. The mineral content of the plant is usually measured in terms of ash yield for standardization ash values are estimated (Ash yield 125 mg/gm, Water soluble ash 58%, Water insoluble ash 42%, Acid soluble ash 79.7%, Acid insoluble ash 20.3% and Sulphated ash 59%). Ash was tested for the presence of 14 different minerals; of these 10 minerals were quantitatively estimated. Nickel and Chromium were found to be absent, but sulphur was present. Quantitative estimation showed aluminum (348.509 mg/100gm), potassium (234.777mg/100gm), iron (119.419 mg/100gm), sodium (86.611 mg/100gm), magnesium (84.799 mg/100gm), phosphorus (78.113 mg/100gm), calcium (13.297), zinc (2.037), copper (1.131) and manganese content (0.681mg/100gm).

**Acknowledgment**

Authors are thankful to Director of Govt. Vidarbha Institute of Science and Humanities, Amravati for providing laboratory facility. They are also thankful to Prof. D. D. Khedkar, Reader, Dept. of Botany, Shri. Shivaji Science College, Amravati for providing photography facilities.

**References**


