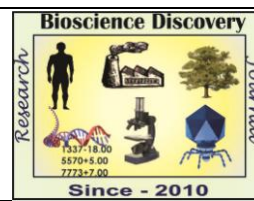


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Research Article



Pharmacognostical studies in *Crossandra infundibuliformis* (L.) Nees.

Sangekar SN and Devarkar VD*

Department of Botany & Research Centre,
Shri Chhatrapati Shivaji College, Omerga Dist. Osmanabad - 413606 (MS)
*devarkar28@gmail.com

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Abstract

Crossandra infundibuliformis (L.) Nees. Family (Acanthaceae) is non-traditional medicinal plant collected from Latur region, situated on the 18.4088° North and 76.5604° East. This plant is studied for morphology, anatomy and phytochemistry. Pharmacognostical screening of compounds like Phenols, Quinones, Flavonoids, Tannins, Terpenoids, and Alkaloids etc. were done for *Crossandra infundibuliformis* (L.) Nees. Detailed results were discussed in the present paper.

INTRODUCTION

Ayurveda, an oldest traditional system of medicine which originated and is practiced in India for more than 5000 years (Naik, 1998). The term “non-traditional” medicine may be better known as complementary and alternative medicine which includes “traditional” Chinese medicine, naturopathic medicine, mind-body medicine, osteopathy, Ayurvedic medicine, etc. Despite research supporting many “non-traditional” practices, many people familiar only with Western medicine believe that most, if not all, alternative methods are useless and ineffective in a technologically and scientifically advanced society (Rebecca, 2013). Medicinal plants have gained more importance as possible source of alternative and effective drugs. Around 12,000 plants secondary Metabolites of antimicrobial importance have been isolated. These compounds fall in one of the major groups of compounds like Phenols, Quinones, Flavonoids, Tannins, Terpenoids, Alkaloids and other mixtures.

Girija *et al.* (1999) worked on micropropagation of *Crossandra infundibuliformis* (L.) Nees. Result shows multiple shoots were induced from axillary and apical buds of *Crossandra infundibuliformis* (L.) on MS medium containing BAP and kinetin individually and maximum number of multiple shoots were obtained from MS medium containing BAP 1 mg. Lokesh *et al.* (2008) worked on the first report on the flower – rot of *Crossandra infundibuliformis* (L.) Nees. A commercial flower crop in India. Lokesh *et al.* (2008) have mentioned the crop is affected by a new flower rot caused by *Fusarium pallidoroseum* (Cooke) Sacc. Severely infected plants had purplish leaves, decayed flowers and shortened internodes and were colonized by the cottony colonies of the fungus. Mary Suba *et al.* (2014) also mentioned only presence of the plant in the homegardens of Kanyakumari but not studied anatomy and chemistry of the plant. Selvakumar S. (2015) recently worked on preliminary phytochemical analysis of arial parts of *Crossandra*

infundibuliformis (L.) Nees. Phytochemical analysis was performed on extract of water, ethyl acetate, acetone chloroform and propane. Thankappan et al. (2015) have mentioned the presence of plants in the campus of Scott Cristian College, Nagarcoil.

MATERIALS AND METHODS

Crossandra infundibuliformis (L.) Nees. was collected from Latur region of the Maharashtra. The survey of the study area was conducted during 2015-2016. During survey data on medicinal uses of the plants used by people from Latur region was documented. Informal discussions, interviews and through communication traditional knowledge about this species collected. Identification of the collected specimens was made with the help of standard floras (Hooker, 1872-1897; Naik, 1998). Herbarium specimens were deposited in the Department of Botany, Shri Chhatrapati Shivaji College, Omerga. Library and Herbarium of Botanical Survey of India, Pune was consulted for review of literature and also for identification of the specimen.

Histochemical screening were performed as per standard methods given in reference books by Gangulee *et al.* (1959), Evans (1996), Gibbs (1974), Harborne (1973), Peach & Tracey (1979), Rastogi & Mehrotra (1999) and Johansen (1940).

Study area

The Latur district is in the Southeastern of the Maharashtra state. Latur town is situated on the 18.4088° North and 76.5604° East. Annual temperatures in Latur range from 13 to 41 °C (55 to 106 °F), with the most comfortable time to visit in the winter, which is October to February. The highest temperature ever recorded was 45.8 °C (114.4 °F). The lowest recorded temperature was 6.9 °C (44.4 °F). This district has few area of forest. As per forest department total forest are in the district is 0.6 % with respect to the total geographical area of the district.

OBSERVATIONS AND RESULTS

Crossandra infundibuliformis (L.) Nees. (Family - Acanthaceae)

Vernacular name English- Firecracker flower, unarmed orange nail dye, Gujarati –Aboli, Hindi – Priyadarshani, Kannada-Abbolige, Marathi – Aboli, Nepali -Priyadarshini, Malayalam – Priyadarshini.

Macromorphology

Erect under shrub, 60-90 cm tall: stem terete, pubescent at that top, leaves in apparent

whorls of 4. Ovate- oblong 3-12 x 1.5-5 cm narrowed at base and decurrent on petioles, entire and undulate, acute or sub obtuse, glabrous above thinly pubescent beneath: petioles 1-3 cm long flower in terminal, peduncles. Erect, 4 sided 10 – 15 cm long spikes, peduncles 4 – 10 cm long thinly pubescent; bracts ovate- oblong 1 – 1.5 cm long, acute, keeled; bracteoles much shorter and narrower, calyx deeply 4 – partite sepals unequal. Imbricate 6 – 10 mm long. Corolla bright arrange with yellow throat tube paler, densely pubescent above the widened base, narrow, 1.5 – 2.5 cm long. bent forward; limb flat, 5 lobed (Lobes 2 + 1 f 2 all forward; limb flat, 5 – lobed (lobes 2 + 1 f2 all arranged on one side). stamens 4 included; anthers celled, villous, capsules oblong 12. 15 mm long subacute, 4-gonous. glabrous. seeds 4. flat, orbicular, densely covered with hydroscopic fimbriate scales.

Micromorphology

T. S. of Root

T.S of *Crossandra infundibuliformis* root shows upper most layers are cork which is thick protective layer. The cork is measured about 30-40 µm. The cork is followed by epidermal or hypodermal cells. The epidermal cells were compactly arranged & measured about 30-35 x 35-40 µm. The epidermis is followed by cortex. The cortical zone was further divided into outer, middle & inner cortex. The cortex is composed of elongated parallel arranged cells. The cells of outer cortex are measured about 25-30 x 40-55 µm. the outer cortex is followed by middle cortex. The cell of middle cortex is measured about 30-35 x 45-50 µm & the cells of inner cortex is measured about 25-30x35-40 µm. The cortical zone is followed by centrally located stele. The Stele was delimited by endodermis. The endodermis is followed by vascular strand. The vascular composed phloem parenchyma. The phloem parenchyma is measured about 12 – 14 x 13-14 µm. The phloem parenchyma interrupted by xylem patches. The xylem cells were measured about 15-20 x 30-35 µm.

T.S. of Stem

The T.S. of stem of *Crossandra infundibuliformis* shows the circular outline and outermost is thick walled barrel shaped & compactly arranged epidermis. (Cuticle is present) The epidermal cells were interrupted by trichomes the epidermal cells were measured about 20-25 x 25-30 µm. There is no collenchyma in Stem. The epidermis is followed by cortex. The cortex is of two type. i.e. - outer and inner cortex the outer cortex is composed of

small compactly arranged parenchyma were inner cortex is composed somewhat larger inner parenchymatous cells than outer cortex. The outer cortical cells were measured about 10-15 x 15-20 µm. The cells of cortex is measured about 30-35 x 35-40 µm. The cortex is followed by stele. The Stele is composed of vascular strand. The dictyostele is present in Stem. The vascular strand shows ring like appearance in T.S. The ring like arrangement of phloem parenchyma is interrupted by xylem elements. The phloem parenchyma & xylem element were measured about 15-16 x 16-20 µm. The xylem elements shows thick walled cells then phloem parenchyma. The vascular tissue is followed by centrally located pith. Pith is of 6-7 layers. This is composed of pith parenchyma. The Pith parenchyma were interrupted by sclerenchymatous cells. The pith cells were measured about 30-40 x 45 – 50 µm.

T. S. Leaf

The leaf lamina dorsiventral the T.S of leaf of *Crossandra infundibuliformis* shows upper epidermis & lower epidermis. Upper epidermis is upper most layer of T.S shows barrel shaped cells which thick walled and compactly arranged cells. The upper epidermis is interrupted by trichome the cuticle is present about the epidermis. The upper epidermal cells were measured about 30-40 x 45 – 50µm. The upper epidermis is followed by single layer of palisade cells. The palisade cells were measured about 15-17 x 50-70µm. The palisade cells are followed by spongy parenchyma which is loosely arranged. The spongy parenchyma measured about 15-20 x 20-25µm. The palisade cells & spongy parenchyma were rich in chlorophyll. The T.S of leaf shows central single vascular strand globular in shape. The vascular tissue is delimited by bundle sheath cells. The bundle sheath cells are compactly arranged & shows ring like appearance surrounding to the vascular strand. The bundle sheath cells were measured about 12-13 x 13-14µm. The bundle sheath cells followed by phloem parenchyma. The phloem parenchyma cells interrupted by xylem patches. The phloem parenchyma measured about 25-30µm. In diameter while xylem element measured about 25-30 x 30-35µm. The T.S shows lower most layer is Lower Epidermis, which is also covered by cuticle. The lower epidermis is composed of compactly arranged having slightly thinner & smaller cells than upper epidermis.

Qualitative Analysis

Qualitative Analysis in *Crossandra infundibuliformis* (L.) Nees. have shown the positive test results for the presence of starch, protein, fat, saponins, glycosides and alkaloids in all the plant part ie. root, stem and leaf. Tannin found absent in root though it has given positive test in stem and leaf.

Quantitative Analysis

Ash Analysis

Root: Total amount of ash in the root was 13.1 %, water soluble was found to be 1.8% water insoluble ash was 11.3%, acid soluble ash was 12% acid insoluble ash was found to be 1.1%

Stem: Total amount of ash in the stem was 11.7 %, water soluble was found to be 01% water insoluble ash was 10.7%, acid soluble ash was 09% acid insoluble ash was found to be 2.7%

Leaf: Total amount of ash in the leaf was 12.3 %, water soluble was found to be 1.2% water insoluble ash was 11.1%, acid soluble ash was 17.6% acid insoluble ash was found to be 0.9%

Moisture: Moisture content in root 8.2%, stem 8.9% and leaf is found in 9.1%.

The values were found in increase in number root < stem < leaf.

Total Sugar

Root: Total Sugar content in root 0.69%, reducing Sugar is found in 0.43% and non-reducing Sugar is 0.26 %

Stem: Total Sugar content in stem 0.88 %, reducing Sugar is found in 0.69% and non-reducing Sugar is 0.19%

Leaf: Total Sugar content in leaf 2.1%, reducing Sugar is found in 1.29% and non-reducing Sugar is 0.81%

Alkaloids: Total alkaloids in root is found in 0.33%, in stem 0.12% and leaf 0.131% is found.

Nitrogen: Amount of nitrogen in root 2.9%, stem 05 % and in leaf 6.3% is found.

Potassium: Amount of potassium in root is 0.211%, stem 0.129% and in leaf 0.219% is found.

Calcium: Amount of calcium in root 01%, stem 1.89% and in leaf 2.9 % is found.

Phosphorus: Amount of Phosphorus in root 0.21%, stem 1.2% and in leaf 3.1% is found.

Crude protein: Amount of Crude protein in root 12.1%, stem 16.2% and in leaf 19.6% is found.

Total free amino acids: Amount of Total free amino acid in root 0.77%, stem 1.3% and in leaf 2.1% is found.

CONCLUSIONS

Crossandra infundibuliformis (L.) Nees.

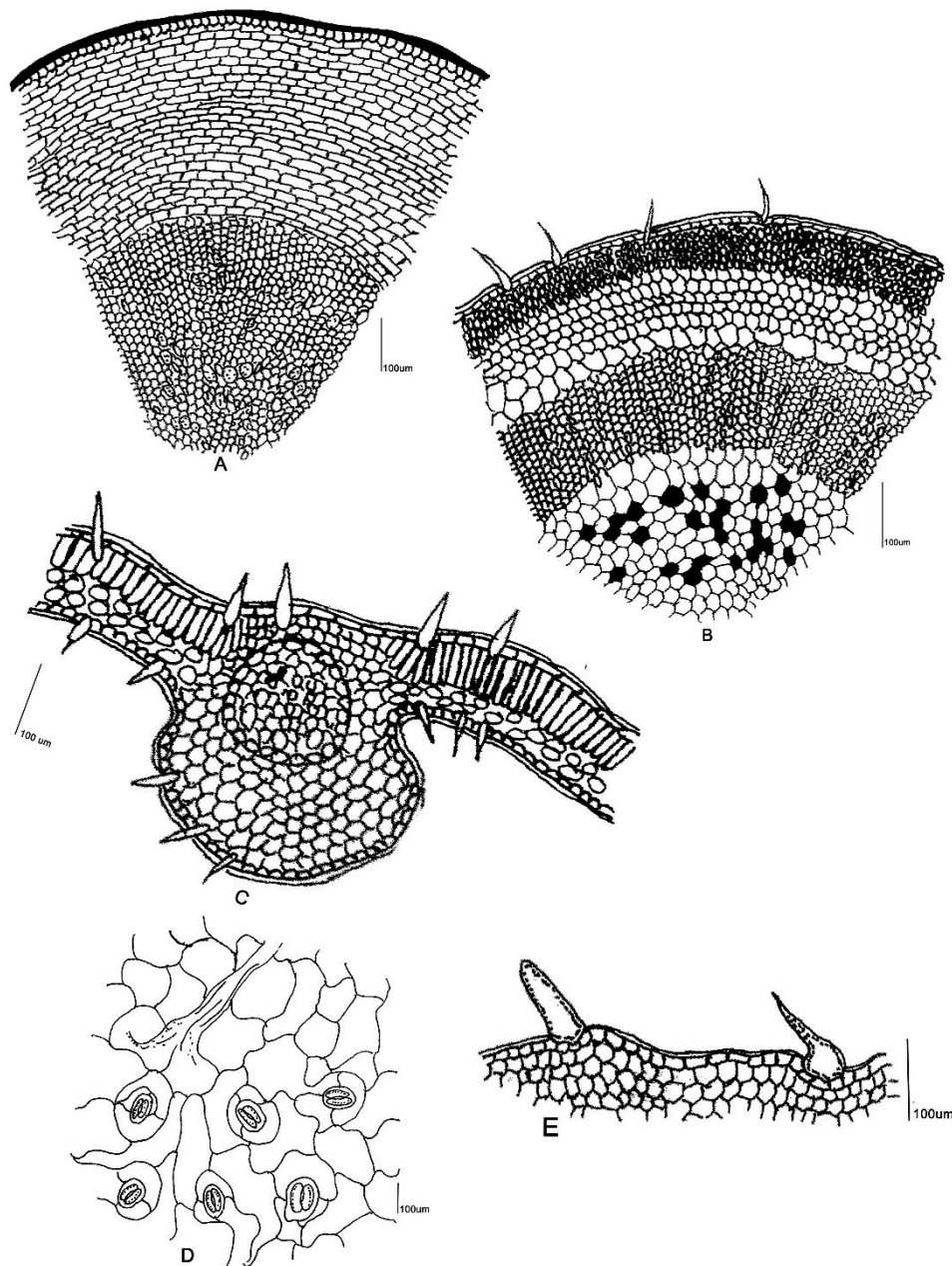


1- Habit sketch showing flowers in inflorescence

The highest amount of water soluble ash is noted in leaf i.e. 1.8% as compared to root and stem. The highest amount of total ash (13.1%), water insoluble ash (11.7%) and acid soluble ash (17.6%) is noted in root as compared to stem and leaf. The highest amount of acid insoluble ash in root (11.3%) and moisture content (9.1%) is noted in leaf as compared to stem and root. The highest total

sugar (2.1%), reducing sugar (1.29%) in leaf as compared to root and stem and non-reducing sugar in leaf (0.81%). Highest contents of alkaloid (0.131%), nitrogen (6.3%) in leaf, Potassium in leaf (0.219%), Calcium (2.9%), Phosphorus (3.1%) in leaf, and Crude protein (19.9%) noted in leaf as compared to root and stem. But highest free amino acids observed in leaf 2.1% as compared to stem and root.

Crossandra infundibuliformis (L.) Nees. (Family - Acanthaceae)



A- T. S. of Root (Sector magnified), B- T. S. of Stem (Sector magnified),
C- T. S. of Leaf (Midrib portion), D- Stomata, E- Trichomes

Thus, highest amount of bioactive compounds present in the leaf is confirmed in this study. This also confirms that, the local people using this plant as maximum benefit from plant as medicinal herb.

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