Think India Journal
ISSN: 0971-1260 Vol-22, Special Issue-31
National Conference ETDAB-2019
Held on 23th & 24th December 2019
Organized by: Deptt. of Botany, Deogiri College, Aurangabad, M.S

Phytochemical and Anatomical Studies inAmaranthus blitum subsp. oleraceus (L.) Costea

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ABSTRACT

Amaranthus blitum subsp. *oleraceus* (L.) Costea(Amaranthaceae) is aweed commonly occurring in crop fields of Latur region. It is usually collected as wild vegetable with medicinal value. This plant is studied for its macro morphology, anatomy and phytochemistry. Pharmacognostical screening for moisture content, ash analysis for various minerals viz. Potassium, Magnesium, Calcium, Phosphorus; Reducing and non-reducing sugars; Crude proteins &Free amino acids and Alkaloids were also done. Detailed results were discussed in the present paper.

Keywords:*Amaranthus blitum* subsp. *oleraceus* (L.) Costea, Phytochemistry,Pharmacognosy, Anatomy

INTRODUCTION

Ayurveda, the oldest traditional system of medicine which originated and is practised 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 Nekolaichuk, 2013). Medicinal plants have gained more importance as a 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.

MATERIAL AND METHODS

Amaranthus blitum subsp. *oleraceus* (L.) Costea(Amaranthaceae) was collected from Latur region of Maharashtra. During survey dataon 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 thecollected specimens was made with the help of standard floras (Hooker, 1872-1897; Naik, 1998).Herbarium specimens are 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 the literature and also for identification of the specimen.

The histochemical screening was performed as per standard methods given in reference books by Ganguleeet. 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 18.4088º North and 76.5604º 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 areas of forest. As per forest department, total forest area in the district is 0.6 %with respect to the total geographical area of the district.

OBSERVATIONS AND RESULTS

***Amaranthus blitum* subsp. *oleraceus* (L.) Costea(Amaranthaceae)** Nevski in Trudy, Bot. Inst. Acad. Newk. SSSR Ser 1. Fl. Sist. Vyes. Rast. 4:3.11. 1937 in Obs. “Roxburghiano”, Nair in J. Bombay Nat. Hist. Soc.

English – Livid Amaranth; Hindi- Shandalio; Sanskrit- Bashpaka, Marisha; Marathi- Tandulja;Kannada- Chilakarive,

Macromorphology

Prostrate or diffuse herb; stem striate 20-30 cm long, much-branched, glabrous or thinly hairy leaves ovate-oblong or spathulate, 1- 3 x 0.5- 2 cm, cuneate at base emarginate at obtuse apex glabrous; petioles 0.5-2 cm long, Flower in dense, axillary clusters; bract and bracteoles ovate,

1.5-2 mm long. Flower in dense, axillary clusters; bracts and bracteoles ovate, 1.5-2 mm acute, membranous.Stamens as long as tepals. ovary avoid, oblong; style unequal. Fruits avoid 1.5 mm long with a broad seedless top, pale brown or red, membranous, Seed globose, 1 mm in diam., black.

Occurrence:Common, on wastelands, old walls etc.
Fls. and Frts. – June to December
Distribution – In all Districts

Note: There has been much confusion regarding the identity and nomenclature of this taxon. N.C. Nair pointed out the correct name of the taxon and discussed its synonymy at length. This confusion was mainly due to the epithet polygoniods, used by Linnaeus and Roxburgh two separate species.

Micromorphology

T. S. of Root

The T. S. Root of *Amaranthus blitum* subsp. *oleraceus* (L.) Costeashows uppermost protective single layer Epidermis is covered by a cuticle. The Epidermis is composed of thick-walled barred shaped cells with a compact arrangement with each other. The epidermal cells were measured about 25-30x30-35 µm, below the Epidermis 3-4 layer of Hypodermis is present. The Hypodermis is measured about 30-35x35-40 µm.

The Hypodermis is followed by Cortex. The Cortex is composed of three types i.e. Outer, Middle and Inner Cortex.

The outer cortex is 4-5 layer made up of Parenchymatous cells with measuring about 30-40x45-55 µm. the Outer Cortex is followed by Middle Cortex is 8 -10 layer made up of Schlerenchymatous cells with measuring about 10-15 x 15-20 µm.

The Cortex is followed by 10-12 Vascular patches with composed of Phloem Parenchyma and Xylem element i.e. Protoxylem and Metaxylem. The Phloem Parenchymatous patches are surrounded to centrally located pith and the Xylem elements were embedded in Phloem patches.

The Phloem parenchyma were measured about 10-15x15-20 µm were as Xylem element measured about 50-55 x 55-60 at the Center of T.S. There is present at 4-5 layered Pith and Pith cells are were measured about 4-5x5.5-6 µm.

T.S. of Stem

The T.S. of *Amaranthus blitum* subsp. *oleraceus* (L.) CosteaStem shows Cork Cambium present, but initially superficial. Uppermost single layers of Epidermis are present, which is composed of compactly arranged barrel-shaped cells with a circular outline. The Collenchymatous cells and Hypodermis is absent in Stem.

This is measured about 35-40x40-45 µm the Epidermal cells were intercepted by Stomata.

The Epidermis is followed by Cortex the Corticoid zone further divided into three types i.e. Outer, Middle and Inner Cortex

The outer Cortex is composed of Parenchymatous cells with measurement about 40-50x45-55 µm.

The Middle Cortex is measured about 45-50 µm and Middle Cortex is interrupted by Vascular patches. Secondary thickening anomalous developing from a conventional cambial ring.

The Inner Cortex is interrupted by Vascular patches.The vessels were small with simple end walls. The Inner Cortex is followed by stele which is of Dictyostle.

Primary Vascular tissues made a ring of bundles and are collateral. The Vascular patches are composed of Phloem Parenchyma and xylem element the Phloem.The central Xylem tissue without Fibre Tracheid; with Libriform fibres. Septate Fibres absent. The fibres are without spiral thickening. The Phloem Parenchyma is measuring about 50-60x55-656µm.

At the centre, there is the presence of Pith.Pith cells were measured about 6-8 µm in diameter.

T.S. of Leaf

The leaf laminadorsoventrally. The T.S. of Leaf of shows bilayer of Epidermis i.e. Upper Epidermis is ticked walled compactly arranged barreled shaped cells with measured about 50-60x55-65 µm. There is an absence of Palisade cell in leaf.

The both Epidermis is covered by Cuticle and Upper Epidermis interrupted by stomata Upper Epidermis is followed by Chlorenchymatous Mesophyll cells which containing crystals is measured about 35-40x45-50 µm.

The sap conducting Vascular bundle present at the centre of T.S. The vascular bundle surrounded and delimiting with bundle sheath cells with measuring about 55-60x60-65 µm. Xylem and phloem element are present in bundle sheath.

The lower epidermis is similar to the upper epidermis but having somewhat thin cells then upper epidermis.

The lower epidermis is also intercepted by Stomata.

Trichomes

The *Amaranthus blitum* subsp. *oleraceus* (L.) Costeashows single cellular Uniserrate type of Trichomes measured about400-600 µm in length.

Stomata

The*Amaranthus blitum* subsp. *oleraceus* (L.) Costeashows Stomata on both surfaces, Tetracyclic type of Stomata were measured about 30-40 x20-25 µm.

Qualitative Analysis

Qualitative Analysis in *Amaranthus blitum* subsp. *oleraceus* (L.) Costeahas 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 a positive test in stem and leaf.

Quantitative Analysis

Parameter Studied	Root	Stem	Leaf
Ash Analysis			
Total Ash	21.1%	19 %	12 %
Water Soluble	2.8%	1.3%	03%
Water Insoluble	18.2%	17.7%	09%
Acid Soluble	20%	15%	11.8%
Acid Insoluble	1.1%	4%	0.2%
Moisture Contents	8.7%	10.6%	9.2%.
Total Sugar	0.99%	2.1 %	2.8%
Reducing Sugar	0.52%	1.32%	1.92%

Non-reducing Sugar	0.47 %	0.78%	0.88%
Total Alkaloids	5%	11.13%	11.13%
Minerals			
Nitrogen	4%	5.2 %	6.8%
Potassium	0.520%	0.926%	0.211%
Calcium	1.2%	2.1%	03 %
Phosphorus	0.97%	1.2 %	3.4%
Crude Protein	18.9%	21.7%	23.1%
Total Free Amino acids	0.2%	0.7%	1.21%

CONCLUSIONS

The highest amount of water-soluble ash is noted in leafi.e.3%, as compared to root and stem. The highest amount of total ash (21.1%), water-insoluble ash 18.2%, and acid-soluble ash 20% are noted in root as compared to stem and leaf.The highest amount of acid-insoluble ash in stem (4%) in comparison to leaf and root, and moisture content (10.6%) is noted in the stem as compared to leaf and root.The highest total sugar (2.8%), reducing sugar (1.92%) in leaf as compared to root and stem and non-reducing sugar in leaf (0.88%)

Highest contents of the alkaloid (11.13%)are same in leaf and stem, nitrogen (6.8%) in leaf, Potassium in stem 0.926%,Calcium leaf 03 %, Phosphorus leaf 3.4%, and Crude protein noted in leaf 23.1% as compare to root and stem. But highest free amino acids observed in leaf 1.21% as compared to stem and root.

Thus, the 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 a maximum benefit from the plant as a medicinal herb.

ACKNOWLEDGEMENTS

Authors wish to express their sincere thanks to Principal, Shri Chhatrapati Shivaji College, Omerga and Yogeshwari Mahavidyalaya Ambajogai for providing research facilities at Botany Laboratory. Authors also thankful to Dr Deepak Bornare and Mr R. M. Chavan Dept. of Water and Soil, MIT College Aurangabad for their help in phytochemical analysis.

REFERENCES

Agharkar, S. P. (1991). Medicinal plants of Bombay Presidency. Scientific Publishers, Jodhpur.

Aiyer, K. L. and Kolammal, M. (1966). Pharmacognosy of Ayurvedic drugs-Kerala Ph. D. Thesis, University of Kerala, Trivandrum.

Aiyer, K.N., Namboodri A. N. and Kolammal, M. (1957-1960). Pharmacognosy of Ayurvedic Drugs of Travancore – Cochin. Series No.1, Central Research Institute, Trivendrum

Ali Mohammed, (Reprint Ed. 2005). Textbook of pharmacognosy. CBS Publishers and distribution, New Delhi, India

Anonymous (1969). "The wealth of India", A Dictionary of Indian Raw Materials and Industrial Products, Vol. VII, Publication and Information Directorate,

Anonymous (1985). Indian Pharmacopoeia, Vol. 2, 3rd edition. Govt. of India, Ministry of Health, Controller of Publications, New Delhi, India.

Anonymous (1986). "Indian Herbal Pharmacopoeia", Vol. I and II, Ministry of Health and Family Welfare (MoHFW), Govt. of India.

Chopra R. N. Nayan S. L. and I. C. Chopra. (1956). Glossary of Indian Medicinal Plants. New Delhi.

Chopra R. N., I. C. Chopra, K. L. Handa & L. D. Kapur (1958). (Sec. Edn.) Indigenous Drugs of India. U. N. Dhur & Sons Private Ltd. 15-Bankim Chatterjee Street. Calcutta.

Chopra, R. N., D. Chopra, B. S. Varma, (1969). Supplement to Glossary of Indian Medicinal Plants. Pull. & Information Directorate, Hill side New Delhi, (India).

Chopra, R. N., R. L. Badhwar, S. Ghosh (1949). Poisonous Plants of India, Delhi. (India).

Costea, Mihai and Tardif, François J. (2003) The Biology of Canadian Weeds. 126. Amaranthus albus L., A. blitoides S. Watson and A. blitum L. Biology Faculty Publications. Paper 75.

Data S. C. and B. Mukherjee, (1950). Pharmacognosy of Indian root and rhizome drug. Ministry of Health, Govt. of India. Pharmacognosy Lab., Bulletin no. 1, Published by Manager of Publication, Delhi.

Desai W. G. (1975). Aushdhi Sangrah (Hindustanatil aushadhi vanaspatinchi olakh, tyanche gundharma va upiyog), Raghuvanshi Prakashan. 242 (13), Shukrawar Peth, Pune-2.

Desmond, Ray (1990). European discovery of India flora. 24. Oxford Publication, London.

Dhale D. A. (2007) Phytochemistry and Pharmacognosy of some medicinal plants from Marathwada region Ph.D. Thesis BAMU Maharashtra.

Dymock, W. (1889). On the use of Turmeric in Hindu Ceremonial J. Asiat. Soc. Bombay, 2 pp. 442-448.

Elwin V. (1939). The Baiga. London.

Gaikwad S. P. and K. U. Garad (2015). Flora of Solapur District, Maharashtra (India) Laxmi Publisher, Solapur, ISBN: 978-1-329-52352-4

Ghamery A. A., Ahmed M. Sadek, Ola H. Abid Elbar (2015). Root anatomy of some species of Amaranthus (Amaranthaceae) and formation of successive cambia. A. Agri. Sci. Vol. 60 (1) pp. 53-60.

Hooker J. D. 1872-1897. The Flora of British India. Vol. I - VII. London.

Kirtikar. K.R. and B. D. Basu. (1918). Indian Medicinal Plants. Vol. I-IV, Allahabad

Nadkarni A. K. (1995). Indian Materia Medica (Vol. I & II). Popular Prakashan Private Ltd. 35c, Tardeo Road, Popular Press Bldg., Bombay 400 034.

Naik V. N. (1998). Flora of Marathwada. Vol. I & II Amrut Prakashan, Aurangabad, India.

Nirmal S. A., J.M. Ingale, G. S. Asane, S.C. Pal and Subhash C. Mandal (2013). Amaranthus blitum L.. Root extract in combination with piperine as a potential treatment of ulcerative colitis in mice Int. J. Pharm. Sci.vol.1 (12) pp. 1-4.

Pullaiah T. & E. Chennaiah. (1997). Flora of Andhra Pradesh (India). Vol.1. Scientific Publishers Jodhpur India.

Pushpangadan P. 1996. Traditional Medicine. In Supplement to Cultivation and Utilization of Medicinal Plants. 689-701. Regional Research Laboratory. CSIR Jammu & Tavi. India.

Sensarma P. (1989). Plant in the Indian Puranas: An Ethnobotanical Investigation, Calcuta: Naya Prokash

Sensarma P. (1992). An Ethnobotanical Investigation into the Linga Purana. J. Econ. Tax. Bot. Addl. Ser. 10 pp. 371-383.

Tambe S. S. (2010) Pharmacognosy and physiology of some medicinal plant of Marathwada in Maharashtra.Ph.D. Thesis BAMU Maharashtra

Online Resources Used

http://discoveredindia.com/maharashtra/land-of-rocks/flora-and-fauna-of-maharashtra.htm

http://docs.vijesti-dana.com/

http://latur.nic.in/html/ataglance.htm

http://onlinelibrary.wiley.com/doi/10.1002/jps.1124/pdf

http://photographers.canvera.com/west/maharashtra/latur/photography-nature-flora-fauna

http://searchguide.level3.com/search/?q=http%3A//acadmicjounl.org =0

http://www.amaranthinstitute.org/sites/default/files/Euphytica%article.pd

https://pfaf.org/user/Plant.aspx?LatinName=Amaranthus+blitum

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Fig. 1: Habit Sketch of*Amaranthus blitum* subsp. *oleraceus* (L.) Costea

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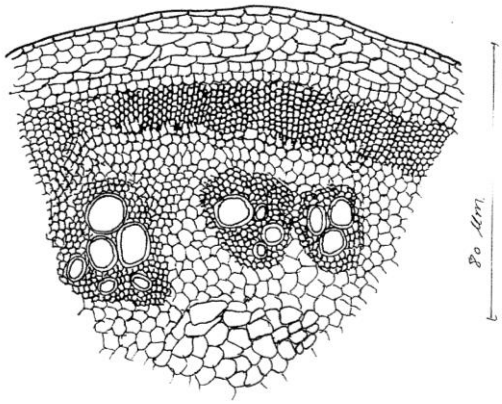

Fig. 2: T.S. Root

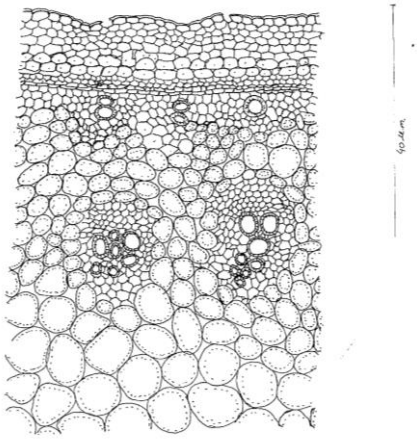

Fig. 3: T. S. Stem

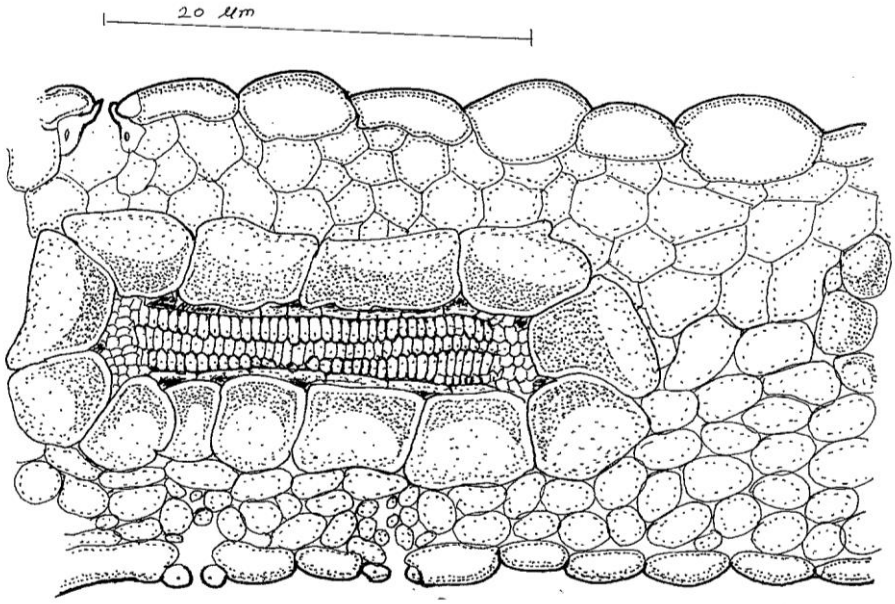

Fig. 4: T. S. Leaf

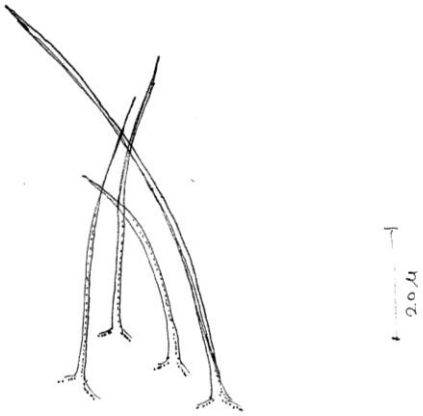

Fig. 5: Tricomes

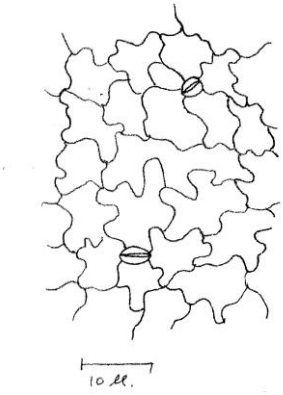

Fig. 6: Stomata