

Chief Editor

Dr. A. Singaraj, M.A., M.Phil., Ph.D.

Editor

Mrs.M.Josephin Immaculate Ruba

EDITORIAL ADVISORS

1. Prof. Dr.Said I.Shalaby, MD,Ph.D.
Professor & Vice President
Tropical Medicine,
Hepatology & Gastroenterology, NRC,
Academy of Scientific Research and Technology,
Cairo, Egypt.
2. Dr. Mussie T. Tessema,
Associate Professor,
Department of Business Administration,
Winona State University, MN,
United States of America,
3. Dr. Mengsteab Tesfayohannes,
Associate Professor,
Department of Management,
Sigmund Weis School of Business,
Susquehanna University,
Selinsgrove, PENN,
United States of America,
4. Dr. Ahmed Sebihi
Associate Professor
Islamic Culture and Social Sciences (ICSS),
Department of General Education (DGE),
Gulf Medical University (GMU),
UAE.
5. Dr. Anne Maduka,
Assistant Professor,
Department of Economics,
Anambra State University,
Igbariam Campus,
Nigeria.
6. Dr. D.K. Awasthi, M.Sc., Ph.D.
Associate Professor
Department of Chemistry,
Sri J.N.P.G. College,
Charbagh, Lucknow,
Uttar Pradesh. India
7. Dr. Tirtharaj Bhoi, M.A, Ph.D,
Assistant Professor,
School of Social Science,
University of Jammu,
Jammu, Jammu & Kashmir, India.
8. Dr. Pradeep Kumar Choudhury,
Assistant Professor,
Institute for Studies in Industrial Development,
An ICSSR Research Institute,
New Delhi- 110070, India.
9. Dr. Gyanendra Awasthi, M.Sc., Ph.D., NET
Associate Professor & HOD
Department of Biochemistry,
Dolphin (PG) Institute of Biomedical & Natural
Sciences,
Dehradun, Uttarakhand, India.
10. Dr. C. Satapathy,
Director,
Amity Humanity Foundation,
Amity Business School, Bhubaneswar,
Orissa, India.



ISSN (Online): 2455-7838

SJIF Impact Factor (2017): 5.705

EPRA International Journal of

Research & Development (IJRD)

Monthly Peer Reviewed & Indexed
International Online Journal

Volume: 3, Issue:8, August 2018



Published By :
EPRA Journals

CC License





PHYTOCHEMICAL EVALUATION OF *BASELLA ALBA* L

Revathi, D.¹

¹PG & Research Department of Botany, Vellalar College for Women (Autonomous),
Thindal, Erode (Dt.), Tamil Nadu, India

Sudha, N².

²PG & Research Department of Botany, Vellalar College for Women (Autonomous),
Thindal, Erode (Dt.), Tamil Nadu, India

ABSTRACT

Herbal plants play an important role in health system. Man utilized the plants for many purposes such as food, medicine, constructions etc. Plants rich in good source of nutrients are also growing as ornamental plants. Basella alba L. is such a type of plant but in the present study it exhibited the presence of alkaloids, flavonoids, phytosterol, saponins, tannin, cardiac glycosides, fixed oil, glycerine, phlobatannin, terpenoids and steroids as secondary metabolites on various extracts.

KEY WORDS: Health, ornamental, *Basella alba*, metabolites

INTRODUCTION

The world is fertile with natural and medicinal plants are now more focused than ever because they have the capacity of producing many benefits to society indeed to mankind, especially in the line of medicine and pharmacological (Ibrahim *et al.*, 2014). Following the advent of modern medicine, herbal medicine suffered a setback, but during last two or three decades, advances in phytochemistry and in identification of plant compounds, effective against certain diseases have renewed the interest in herbal medicines (Aboaba *et al.*, 2006). Not only the plants growing in the wild have healing properties but also growing as ornamental the plants may possess medicinal potential too. In the same way *Basella alba* L. is planted as an ornamental plant, which is glabrous succulent climbing herb commonly known as Malabar Spinach, vine spinach, red vine spinach, climbing spinach, creeping spinach, buffalo spinach or Ceylon spinach, since it is usually used as a substitute for spinach and in Tamil it is called Kodi pasalai. It is a good source of fiber, vitamins A, B, and C, minerals like calcium, magnesium and iron, and several antioxidants. It also contains essential amino acids such as arginine,

isoleucine, leucine, lysine, threonine, tryptophan, thiamine, riboflavin and niacin and a low percentage of soluble oxalates. The leaves contain carotenoids, organic acids, water soluble polysaccharides, bioflavonoid, betacyanin and vitamin K. Also, triterpene oligoglycosides basella saponins A, B, C and D, beta vulgaroside I, momordins II b and II c have been isolated from the plant (Deshmukh and Gaikwad, 2014) and also found out that the anticancer, antioxidant and anti-inflammatory properties of *Basella alba* were attributed to the presence of β -sitosterol and lupeol.

B. alba is traditionally used as medicine for diverse diseases. In Ayurveda, it is used for hemorrhages, skin diseases sexual weakness and ulcers and as laxative in children and pregnant women. The plant is febrifuge, its juice is a safe aperient for pregnant women and a decoction has been used to alleviate labour. It is also an astringent and the cooked roots are used in the treatment of diarrhea. The leaf juice is a demulcent, used in cases of dysentery (Smith and Sotiris Missailis, 2004). *Basella* mucilage has been used in Thai traditional medicine as topical application for irritant, bruise, ringworm and laboring. Stem and

leaves are used as mild laxative, diuretic and antipyretic and the plant serves as a Thai traditional vegetable. The fruit provides dark violet color for food colorant (Chou, 1997). *Basella alba* has been used for the treatment of Anemia in women, coughs, cold (leaf with stem), cold related infections (Rahmatullah *et al.*, 2010). Maceration is taken orally for infertility, pelvic inflammatory disease, orchitis, epididymitis, threatened abortion, spurious labour (Focho *et al.*, 2009). Leaves are used in constipation, poultice for sores, urticaria and gonorrhoea. It is also used in poultice local swellings, intestinal complaints etc (Yasmin *et al.*, 2009). The mucilaginous liquid obtained from the leaves and tender stalks of plants is popular remedy for headaches (Jadhav *et al.*, 2011). In India, it has been used for antipruritic and burn (Saikia *et al.*, 2006) and has been used in Bangladesh for acne and freckle treatment (Akhter *et al.*, 2008). The Ayurveda treatment in India has been used *B. alba* leaves and stem for anticancer such as melanoma, leukemia and oral cancer (Premalatha and Rajgopal, 2005). Root and leaves has been used for the removal of after birth, stomach pains and increase milk production (Pascaline *et al.*, 2010). *Basella alba* is administered orally for the treatment of anal prolapsed or hernia. The leaf juice is used in Nepal to treat dysentery, catarrh and applied externally to treat boils. The mucilaginous qualities of the plant make it an excellent thickening agent in soups, stews, etc (Ramu *et al.*, 2011). These healing properties may be due the presence of secondary metabolites of the *Basella alba* plant. Hence, in the present study, various extracts of *B. alba* stem, leaves and fruits were used to detect the presence of phytochemicals.

MATERIALS AND METHODS

Collection of the Plant material

The plant *Basella alba* L. was collected from Salem (Dt.), Tamil Nadu, India. The plant was identified with the help of Flora of the Presidency of Madras (Gamble and Fischer, 1934).

Preparation of Plant Extracts

The stem, leaves and fruits of *B. alba* were collected, washed with water, separately dried under the shade and powdered. Maceration and infusion methods of extraction were used for extract preparation (Handa *et al.*, 2008). Maceration method was used for preparing the different solvent extracts such as petroleum ether, methanol and ethanol. The infusion method was used for preparing water (aqueous) extract.

Phytochemical Screening Methods

The standard methods were followed to identify various secondary metabolites in petroleum ether, methanol, ethanol and aqueous extracts (Harbone, 1973; Trease and Evans, 1987; Sofowora, 1993 and Kokate *et al.*, 2005)

RESULTS

The phytochemical analysis of *B. alba* stem revealed the presence of flavonoids, saponins, glycerine, terpenoids and steroids whereas the leaves consists of saponin, tannin, cardiac glycosides, terpenoids and steroids while fruit extract possess alkaloids, flavonoids, phytosterol, saponin, cardiac glycosides, fixed oil, glycerine, phlobatannin and terpenoids on various extracts. Table 1 summarized the results of phytochemical analysis of *B. alba* stem, leaves and fruits on various extracts.

DISCUSSION

Plants still represent a large untapped source of structurally novel compounds that might serve as lead for the development of novel drugs (Cowan 1999). *B. alba* are rich in chemical constituents in stem, leaves and fruits. Different extracts were used to study the presence or absence of phytochemicals. The alkaloids are present in fruits (ethanol and aqueous extracts), flavonoids in stem (aqueous extract) and fruits (methanol extract), phytosterol in fruits (ethanol extract), saponin in stem (aqueous extract), leaves (aqueous extract) and fruits (methanol and aqueous extracts), tannin in leaves (methanol and ethanol extracts), cardiac glycosides in leaves (petroleum ether and ethanol extracts) and fruits (aqueous extract), fixed oil in fruits (petroleum ether, methanol and ethanol extracts), glycerine in stem (petroleum ether, methanol, ethanol and aqueous extracts), leaves (ethanol and aqueous extracts) and fruits (petroleum ether and ethanol extracts), phlobatannin in fruit (ethanol extract), terpenoids in stem (petroleum ether, methanol, ethanol and aqueous extracts), leaves (petroleum ether, methanol and ethanol extracts) and fruits (petroleum ether, methanol, ethanol and aqueous extracts) and steroids in stem (methanol and ethanol extracts) and leaves (petroleum ether extract). The results of the present study agree with many earlier studies which also found that not all phytochemicals are present in all plant parts and that those present differ according to the type of the extracting solvent used (Tijjani *et al.*, 2009; Ayinde *et al.*, 2007). The present finding confirmed this statement. Similarly Azad *et al.* (2013); Suganthi and Tamilarasi (2015) and Jovale *et al.* (2015) reported the good source of phytochemicals in *B. alba*.

The phyto-compounds are great significance in biological activities. Many earlier works reviewed various biological activities of secondary metabolites on human health. The biological properties of alkaloids are anti-hypertensive, anti-malarial, anti-cancer, analgesic (Wink *et al.*, 1998) and antibacterial activities (Mantle *et al.*, 2000). A number of plant alkaloids (Azam *et al.*, 2003) and flavonoids (De Sousa *et al.*, 2004) have been shown to possess antioxidant properties. Flavonoids are reported to possess anti-proliferative, anti-tumor, anti-inflammatory, pro-

apoptotic activities with molecular targets (Williams *et al.*, 2004; Sung *et al.*, 2007 and Buer *et al.*, 2010). Tannins are astringent and are used for intestinal disorders such as diarrhoea and dysentery (Dharmananda, 2003) and possess antioxidants, antimicrobial and anti-carcinogenic agents (Lai *et al.*, 2010). Trease and Evans (2002) reported the cardiac glycosides are used for treatment of various diseases associated with heart. Saponins and glycosides are also very important classes of secondary metabolites as some are cardio-active and used in treatment of heart

conditions (Oloyode, 2005). Terpenoids have anti-carcinogenic, anti-malarial, anti-ulcer, antimicrobial and anti-inflammatory activities (Langenheim, 1994 and Dudareva *et al.*, 2004).

CONCLUSION

From the present research it concluded that *B. alba* is not only used for edible purpose, but also it have plenty of phytoconstituents. Further study need for isolation and purification of bioactive compounds.

Table: 1- Phytochemical evaluation of *B. alba* stem, leaves and fruits on various extracts

Phytochemicals	Plant parts	Petroleum ether extract	Methanol extract	Ethanol extract	Aqueous extract
Alkaloids	Stem	-	-	-	-
	Leaves	-	-	-	-
	Fruits	-	-	+	+
Flavonoids	Stem	-	-	-	+
	Leaves	-	-	-	-
	Fruits	-	+	-	-
Phytosterols	Stem	-	-	-	-
	Leaves	-	-	-	-
	Fruits	-	-	+	-
Saponin	Stem	-	-	-	+
	Leaves	-	-	-	+
	Fruits	-	+	-	+
Tannin	Stem	-	-	-	-
	Leaves	-	+	+	-
	Fruits	-	-	-	-
Cardiac glycosides	Stem	-	-	-	-
	Leaves	+	-	+	-
	Fruits	-	-	-	+
Fixed oil	Stem	-	-	-	-
	Leaves	-	-	-	-
	Fruits	+	+	+	-
Glycerine	Stem	+	+	+	+
	Leaves	-	-	+	+
	Fruits	+	-	+	-
Phlobatannin	Stem	-	-	-	-
	Leaves	-	-	-	-
	Fruits	-	-	+	-
Terpenoids	Stem	+	+	+	+
	Leaves	+	+	+	-
	Fruits	+	+	+	+
Steroids	Stem	-	+	+	-
	Leaves	+	-	-	-
	Fruits	-	-	-	-

“+” indicates phytochemicals present “-” indicates phytochemicals absent

REFERENCES

1. Ibrahim T.A., Ajongbolo K.F., Aladekoyi G. (2014). “Phytochemical Screening and Antimicrobial Activity of Crude Extracts of *Basella alba* and *Helianthus annuus* on Selected Food Pathogens”. *Research and Reviews: Journal of Microbiology and Biotechnology*, 3(2):27-31.
2. Aboaba O.O., Smith S.I., Olide F.O. (2006). “Antimicrobial effect of Edible extracted on *Escherichia coli* 0157:H7”. *Pak J Nutr.*, 5(4): 325 – 327.
3. Deshmukh S.A., Gaikwad D.K. (2014). “A review of the taxonomy, ethnobotany, phytochemistry, and pharmacology

- of *Basella alba* (Basellaceae)". *Journal of Applied Pharmaceutical Science*, 4(01): 153-165.
4. Smith G.R., Sotiris Missailidis. (2004). "Cancer inflammation and the AT1 and AT2 receptors". *Journal of Inflammation*, 1:3, 10.1186/1476-9255-1-3.
 5. Chou C.T. (1997). "The anti-inflammatory effect of *Tripterygium wilfordii* Hook F on adjuvant-induced paw edema in rats and inflammatory mediators release". *Phytother Res.*, 11: 152-154.
 6. Rahmatullah, M., Rahman A., Haque Z., Mollik A.H., Emdad UllahMiajee Z.U.M., Begum R., Rahman M., Nasrin D., Seraj S., Chowdhury A.R., Khatun Z., Khatun, A. (2010). "A Survey of Medicinal Plants used by Folk Medicinal Practitioners of Station Purbo Para Village of JamalpurSadarUpazila in Jamalpur district, Bangladesh". *American-Eurasian Journal of Sustainable Agriculture*, 4(2): 122-135.
 7. Focho D.A., Nkeng E.A.P., Lucha C.F., Ndam C.F., Afegeni A. (2009). "Ethnobotanical survey of plants used to treat diseases of the reproductive system and preliminary phytochemical screening of some species of malvaceae in Ndop Central Sub-division, Cameroon". *Journal of Medicinal Plants Research*, 3(4): 301-3141.
 8. Yasmin H., Kaiser M.A., Rahman M.M., Rahman M.S., Rashid M.A. (2009). "Preliminary antibacterial activity of some indigenous plants". *The Dhaka University Journal of Pharmaceutical Sciences*, 8: 61-66.
 9. Jadhav V.D., Mahadkar S.D., Valvi S.R. (2011). "Documentation and ethnobotanical survey of wild edible plants from Kolhapur District". *Recent Research in Science and Technology*, 3(12): 58-63.
 10. Saikia A.P., Ryakala V.K., Sharma P., Goswami P., Bora U. (2006). "Ethnobotany of medicinal plants used by Assamese people for various skin ailments and cosmetics". *J. Ethnopharmacol.*, 106: 149-157.
 11. Akhter S., Abdul H., Shawkat I.S., Swapan K.S., Mohammad S.H.C., Sanjay S.S. (2008). "A review on the use of non-timber forest products in beauty-care in Bangladesh". *J. Forestry Res.*, 19: 72-78.
 12. Premalatha B., Rajgopal G. (2005). "Cancer-an ayurvedic perspective". *Pharmacol Res.*, 51: 19-30.
 13. Pascaline J., Charles M, George O., Lukhoba C., Ruth L.N., Solomon D.M. (2010). "Ethnobotanical survey and propagation of some endangered medicinal plants from south Nandi district of Kenya". *Journal of Animal and Plant Sciences*, 8(3): 1016-1043.
 14. Ramu G., Krishna Mohan G., Jayaveera K.N. (2011). "Preliminary investigation of patchaippasali mucilage (*Basellaalba*) as tablet binder." *IJGP*, 5(1): 24-27.
 15. Gamble, J.S., Fishcer, C.E.C. (1934). *Flora of the Presidency of Madras. Vol. I, II and III.* Neeraj Publishing House, Delhi.
 16. Handa S.S., Khanuja S.P.S., Longo G., Rakesh D.D. (2008). "Extraction Technologies for Medicinal and Aromatic Plants", (1stedn), no. 66. Italy: United Nations Industrial Development Organization and the International Centre for Science and High Technology.
 17. Harbone J.B. (1973). "Phytochemical methods", 3rd Edition. D.E. and Hall Ltd., London: 135-270.
 18. Trease G.E., Evans W.C. (1987). "Pharmacognosy", 11th edition. Brailliar Tiridel and Mac Millian publishers, London.
 19. Sofowora A. (1993). "Medicinal plants and traditional medicine in Africa". John Wiley and Son Ltd.:150-153.
 20. Kokate C.K., Purohit A.P., Gokhale S.B. (2005). "Pharmacognosy", 31st edition, Nirali Prakashan, Pune: 1-131.
 21. Cowan M.M. (1999). "Plants products antimicrobial agents". *Clin. Microbial. Rev.*, 14: 564- 584.
 22. Tijjani M., Bello I., Aluyi A., Olurishe T., Maidaava S., Habila J., Balogun E. (2009). "Phytochemical and antibacterial studies of root extract of *Cochlospermum tinctorium*". *Res. J. Med. Plants.*, 3: 16-22.
 23. Ayinde B.A., Omogbai E.K., Amaechina F.C. (2007). "Pharmacognosy and hypotensive evaluation of *Ficus exasperata* Vahl (Moraceae) leaf". *Acta pol pharm.*, 64: 543-546.
 24. Azad A.K., Wan Azizi W.S., Babar Z.M., Zubair Khalid Labu and Zabin S. (2013). "An Overview on Phytochemical, Anti-Inflammatory and Anti-Bacterial Activity of *Basella alba* Leaves Extract". *Middle-East Journal of Scientific Research* 14 (5): 650-655.
 25. Suganthi A., Tamilarasi A. (2015). "Comparative studies on phytochemical analysis of *Basella alba* (L.) Varieties". *World journal of pharmacy and pharmaceutical sciences*, 4(10):1089-1098.
 26. Jovale Vincent V. Tongco, Angustia D. Añis, Jelyne P. Tamayo. (2015). "Nutritional Analysis, Phytochemical Screening, and Total Phenolic Content of *Basella alba* Leaves from the Philippines". *International Journal of Pharmacognosy and Phytochemical Research*, 7(5): 1031-1033.
 27. Wink M., Schmeller T., Latz-Brüning B. (1998). "Modes of action of allelochemical alkaloids: Interaction with neuroreceptors, DNA and other molecular targets". *Journal of chemical Ecology*, 24:1888-1937.
 28. Mantle D., Eddeb F., Pickering A.T. (2000). "Comparison of relative antioxidant activities of British medicinal plant species in vitro". *J. Ethnopharmacol.*, 72:47 - 51.
 29. Azam S., Hadi N., Khan N.U., Hadi S.M. (2003). "Antioxidant and prooxidant properties of caffeine, theobromine and xanthine". *Medical Science Monitor*, 9: 325-330.
 30. De Sousa E., Zanatta L., Seifriz I., Creczynski-Pasa T.B., Pizzolatti M.G., Szpoganicz B., Silva, F.R. (2004). "Hypoglycaemic effect and antioxidant potential of Kaempferol-3,7-O-(alpha)-dirhamnoside from *Bauhinia forficata* leaves". *Journal of Natural Products*, 67:829-832.
 31. Williams R.J., Spencer J.P.E., Rice-Evans C. (2004). "Flavonoids: antioxidants or signaling molecules?" *Free Radic. Biol. Med.*, 36: 838-849.
 32. Sung B., Pandey M.K., Aggarwal B.B. (2007). "Fisetin, an inhibitor of cyclin-dependent kinase 6, down-regulates nuclear factor-kappa B- regulated cell proliferation, antiapoptotic and metastatic gene products through the suppression of TAK-1 and receptor- interacting protein-regulated I kappa B alpha kinase activation". *Mol. Pharmacol.*, 71: 1703-1714.
 33. Buer C.S., Imin N., Djordjevic M.A. (2010). "Flavonoids: New roles for old molecules". *J. Integr. Plant Biol.*, 52 (1): 98-111.
 34. Dharmananda S. (2003). "Gallnuts and the uses of Tannins in Chinese Medicine". In: *Proceedings of Institute for Traditional Medicine, Portland, Oregon.*

35. Lai F.R., Wen Q.B., Li L., Wu H., Li X.F. (2010). "Antioxidant activities of water-soluble polysaccharide extracted from mung bean (*Vigna radiata* L.) hull with ultrasonic assisted treatment". *Carbohydr. Polym.*, 81: 323-329.
36. Trease G.E., Evans W.C. (2002). "Pharmacognosy". 15th edition, Harcourt brace & Co. Asia, Pvt. Ltd., W.B. Saunders Company Ltd.
37. Oloyode O.I. (2005). "Chemical profile of unripe pulp of *Carica papaya*". *Pakistan Journal of Nutrition*, 4(6): 379-381.
38. Langenheim J.H. (1994). "Higher plant terpenoids: A phytocentric overview of their ecological roles". *Journal of Chemical Ecology*, 20: 1223-1280.
39. Dudareva N., Pichersky E., Gershenzon J. (2004). "Biochemistry of plant volatiles". *Plant Physiology*, 135:1893-1902.