

# Drying study on *Bryophyllum pinnatum* leaves powder and its fortification in food product

■ Shital R. Pawar and Surekha B. Dabhade

Received : 10.04.2018; Accepted : 13.04.2018

See end of the Paper for authors' affiliation

Correspondence to :

**Shital R. Pawar**

Department of Agricultural Engineering, Maharashtra Institute of Technology, Aurangabad (M.S.) India  
Email : [pshital4912@gmail.com](mailto:pshital4912@gmail.com)

■ **Abstract :** The *Bryophyllum pinnatum* is a medicinal plant. The family of *Bryophyllum pinnatum* is *Crassulaceae*. The native place of *Bryophyllum pinnatum* is Madagascar. In *Bryophyllum pinnatum*, number of bioactive component is present such as alkaloids, triterpenes, lipids, flavonoids, glycosides, bufadienolides, saponin, phenols, and organic acid. *Bryophyllum pinnatum* is a medicinal plant and used as a treat the number of diseases like anthelmintic, wound healing, antioxidant activity and anti-inflammatory, etc. Mostly *Bryophyllum pinnatum* leaves used to treat Urinary Tract Infection. This review studied on the nutritional composition of the *Bryophyllum pinnatum* leaves powder after drying and its fortification into food product. *Bryophyllum pinnatum* leaves is a good source of human nutrition and good dietary supplements. There are number of alternative drying methods will be used for the drying of the *Bryophyllum pinnatum* leaves instead of shade drying method. Alternative methods of drying are Microwave drying and tray drying. This drying will be carried out at different temperature for specific time period. The *Bryophyllum pinnatum* leaves powder is fortified into the different food product like, bakery, confectionary, extruded products, etc. This food product shows nutritional as well as medicinal values it is called as nutraceutical food. The main objective of this review is drying study on leaves, nutritional composition and its fortification in food product.

■ **Key words :** *Bryophyllum* Leaves, Medicinal value, Nutritional composition, Drying methods

■ **How to cite this paper :** Pawar, Shital R. and Dabhade, Surekha B. (2018). Drying study on *Bryophyllum pinnatum* leaves powder and its fortification in food product. *Internat. J. Agric. Engg.*, **11**(Sp. Issue) : 155-158, DOI: 10.15740/HAS/IJAE/11.Sp. Issue/155-158.

*Bryophyllum pinnatum* is a medicinal plant, largely used in folk medicine. It belongs to the family *Crassulaceae* and botanical name is *Bryophyllum pinnatum*. *Bryophyllum pinnatum* is commonly known as air plant, miracle leaf, life plant, zakhm-e-hyat, panfiti, love plant, patharjatta and ghayamari (Jain *et al.*, 2010). *Bryophyllum pinnatum* has been accepted as a herbal remedy in mostly all parts of the world (Olajide, 1998 and Gupta *et al.*, 2010). The origin of *Bryophyllum pinnatum* is Madagascar. *Bryophyllum pinnatum* grows

widely and used as folk medicine in tropical Africa, India, China, Australia and tropical America, Madagascar, Asia and Hawaii (Lans, 2006 and Yadav and Dixit, 2003). *Bryophyllum pinnatum* is an erect, succulent, perennial shrub that grows about 1.5 m height with opposite, glabrous leaves (3-5 deeply crenulated, fleshy leaflets) and it reproduces vegetatively from leaf bubblis (John Ojewole, 2002 and Agoha, 1974). *Bryophyllum pinnatum* is astringent, sour in taste, sweet in the post digestive effect and has hot potency (Kamboj and Saluja,

2009). *Bryophyllum pinnatum* contains number of active compound groups such as, alkaloids, triterpenes, lipids, flavonoids, phenols, carotenoids, tocopherol, quinines, glycosides, bufadienolides, saponin and coumarins (Hossan and Yemitan, 2009; Kanika, 2011 and Gaind and Gupta, 1972). It is used traditional medicine for the treatment of different diseases like anthelmintic, immunosuppressive, Hepatoprotective, anticonvulsant, Neuropharmacological and antipyretic (Kamboj and Saluja, 2009). The plant shows Hepatoprotective activity and is also used to increase vascular integrity, to treat hypertension and kidney stones (Lans, 2006). In India mostly *Bryophyllum pinnatum* leaves used to treat urinary stone (kidney stone) (Vaidhya, 2010 and Chunekar and Pandey, 2010). *Bryophyllum pinnatum* is used traditional treatment of earache, burns, abscess, ulcer, insect bites, diarrhea and lithiasis (Halliwell and Gutteridge, 1997).

The different methods of drying are used for the preparation of *Bryophyllum pinnatum* leaves powder. These drying methods are sun drying, tray drying, microwave drying, and other drying methods. Drying of *Bryophyllum pinnatum* leaves is carried at different temperature for specific time period. Time required for sun drying is 2-3 wee. Tray drying required more time than microwave drying (Yongasawatdigul and Gunasekaran, 1996). After the drying of leaves are grinded by grinder. *Bryophyllum pinnatum* leaves shows medicinal as well as nutritional properties. This powder is fortified into the food products like bakery, confectionary, extruded product, etc. After the addition of leaves powder in food product it shows nutritional as well as medicinal properties it comes under the nutraceutical food (Mogra *et al.*, 2012). Fortification is defined as the practice of deliberately increasing the content of an essential micronutrient, *i.e.* vitamins and minerals in a food before processing or not so as to improve the nutritional quality of the food supply and to provide a public health benefits with minimal risk to health (WHO, 2010). The objective of this review is the, to develop the nutraceutical food product and to study the drying method and its nutritional composition of *Bryophyllum pinnatum* leaves powder. Nutritional composition of *Bryophyllum pinnatum* leaves powder is as follows Table 1 (Okwu, 2004 and Okwu and Josiah, 2006).

Name of nutrient	Values (%)
Carbohydrate	72.92 ± 1.08
Protein	5.38 ± 0.10
Fat	1.28 ± 0.07
Potassium	3.49 ± 0.01
Calcium	4.99 ± 0.01
Crude fibre	6.02 ± 1.06
Ash content	1.21 ± 0.07

### Health benefits :

#### Antimicrobial activity :

5 methyl 4,5,7trihydroxyl flavones and 4,3,5,7 tetrahydroxyb 5 methyl 5 propenamine anthocyanidines shows antimicrobial activities against *Pseudomonas aeruginosa*, *E. coli*, *staphylococcus aureus*, *Klebsiella pneumonia*, *Candida albicans* and *Aspergillus niger*. Typhoid fever and bacterial infection is treated by 60 % methanolic extract from *Bryophyllum pinnatum* leaf (Okwu and Nnamdi, 2011 and Akinpelu, 2000). *Bryophyllin A* and *bryophyllin C* shows strong insecticidal properties (Veitch and Grayer, 2007).

#### Immunomodulatory effect :

The liquid of leaves causes inhibition of cell-mediated and humoral immune responses in mice. Leaf extracts inhibited invitro lymphocyte proliferation and showed invivo immunosuppressive activity, it have been proved that the aqueous extract of leaves possesses immunosuppressive activity (Rossi-Bergmann *et al.*, 1994). Fatty acid present in *Bryophyllum pinnatum* is responsible for its immunosuppressive effect invivo as from the ethanolic extract a purified fraction (KP12SA) of *Bryophyllum pinnatum* found 20- fold more potent to block murine lymphocyte proliferation than the crude extract (Almedida *et al.*, 2000).

#### Neproprotective activity :

The aqueous extract of the leaves of *Bryophyllum pinnatum* possess potent neproprotective activity in Gentamycin- induced nephrotoxicity in rats (Harlalka and Patil, 2007). The plant extract was found to exert less diuretic and antiurolithic activity (Patil *et al.*, 2008).

#### Antihypertensive :

The study shown the presence of Anti-hypertensive activity of *Bryophyllum pinnatum* aqueous and methanolic leaf extracts on arterial blood pressure and

heart rates of normotensive and spontaneously hypertensive rats. The Methanolic extract of leaf decrease in arterial blood pressure and heart rates (John Ojewole, 2002).

#### Wound healing activity :

The ethanolic extract of leaves of the plant is used for its wound healing activity by using excision wound model in rats. Steroid glycosides present in *Bryophyllum pinnatum* leaves shows wound healing activity (Nayak *et al.*, 2010 and Prasad *et al.*, 2012).

#### Anticancer property :

Ethanolic extract of *Bryophyllum pinnatum* leaves has ant cancerous activity. Bufadienolides present in *Bryophyllum Pinnatum* leaves shows strong cancer chemopreventive agents. Five bufadienolides isolated from the leaves of the plant is inhibitory effect on Epstein-Bar virus early antigen (EBV- EA) activation in Raji cells decrease by the tumour promoter, 12-Otetradecanoylphorbol- 13- acetate. All bufadienolides show inhibitory activity. Bryophyllin A shows highest activity (Supratman *et al.*, 2001).

#### Conclusion :

After the studied on the research paper we can be concluded that the *Bryophyllum pinnatum* herb, used worldwide. In this review studied on the ethanobotanical use of *Bryophyllum pinnatum* and supported the therapeutic utility of the plant in various disorders mainly in diseases of the urinary system without adverse side effect. Antioxidants which prevent oxidative, cell damage have strong anti-cancer activity. This may be the reason *Bryophyllum pinnatum* used in treatment of wounds, burns and ulcer in herbal medicine. The extract from the leaf could be a good source of useful drugs. The use of *Bryophyllum pinnatum* leaf extract is only in the pharmaceutical for the preparation of different drugs for treating and curing the different diseases. We will be used leaf powder into the food product it's called food fortification.

---

#### Authors' affiliations:

**Surekha B. Dabhade**, Department of Agricultural Engineering, Maharashtra Institute of Technology, Aurangabad (M.S.) India

---

#### ■ REFERENCES

- Agoha, R.C. (1974).** Medicinal plant of migeria. Offset Drakkerji. Faculfcitder Wiskunde in Naturwetenschappen, the Netherlands. *Science Bulletin*, **4**: 33-41.
- Akinpelu, D.A. (2000).** Antimicrobial activity of *Bryophyllum pinnatum* leaves. *Fitoterapia*, **71**:193 – 194.
- Almeida, A.P., Da Silva, S.A., Souza, M.L., Lima, L.M., Rossi-Bergmann, B., de Moraes, V.L. and Costa, S.S. (2000).** Isolation and chemicals Analysis of a fatty acid fraction of *Kalanchoe Pinnat* with a potent lymphocyte suppressive activity. *Planta Medica*, **66**:134-137.
- Chunekar, K.C. and Pandey, G.S. (2010).** Editor. Bhavaprakasha Nighantu of Bhavamishra, Chaukambha Bharati Academy, Varanasi, 101-105.
- Gaind, K. and Gupta, R. (1972).** Alkanes, alkanols, triterpenes, and sterols of *Kalanchoe Pinnata*. *Phytochemistry*, **11**:1500-1502.
- Gupta, R., Lohani, M. and Arora, S.K. (2010).** Anti-inflammatory activity of the leaf extract/fractions of *Bryophyllum pinnatum*. *Internat. J. Pharmaceu. Sci. Rev. & Res.*, **3**(1):16-18
- Halliwell, B. and Gutteridge, J.M.C. (1997).** Free radical in biology and medicine, nitric oxide scavenging by curcuminoids. *J. Pharmacy & Pharmacol.*, **49**:105-107.
- Harlalka, G.V. and Patil, C.R. (2007).** Protective effect of *Kalanchoe pinnata* Pers. (Crassulaceae) on gentamicine induced nrphrotoxicity in rats. *Indian J. Pharmacol.*, **39**(4): 201-205.
- Hossan, M.S. and Yemitan, O.K. (2009).** Neuropharmacological effects of aqueous leaf extract of *Bryophyllum pinnatum* in Mice. *African J. Biomedical Res.*, :101-107.
- Jain, V.C., Patel, N.M., Shah, D.P., Patel, P.K. and Joshi, B.H. (2010).** Antioxidant and antimicrobial activities of *Bryophyllum calycinum* salisb leaf. *Pharmacologyonline*, **1** : 393-405.
- John Ojewole, A.O. (2002).** Antihypertensive properties of *Bryophyllum pinnatum* (Lam) oken leaf extracts. *American J. Hypertension*, **15** : 34.
- Kamboj, A. and Saluja, A.K. (2009).** *Bryophyllum pinnatum* (Lam.) Kurz. Phytochemical and pharmacological profile, A review. *Pharmacognosy Rev.*, **3** : 364-374.
- Kanika, P. (2011).** Pharmacognostic and phytochemical evaluation of *Bryophyllum pinnatum* leaves. *J. Adv. Sci. & Res.*, **2**(1):42-49.
- Lans, C.A. (2006).** Ethnomedicines used in Trinidad and

- Tobago for urinary problems and diabetes mellitus. *J. Ethnobiol Ethnomed*, **2** (45):1745-1750.
- Mogra, R., Banga, J. and Rathi, P. (2012).** Nutrient composition of cauliflower (*Brassica oleraceae*) leaf powder and its acceptability in fast food snacks. *Food Sci. & Res. J.*, **3** (2): 167-171.
- Nayak, B.S., Marshall, J.R. and Isitor, G. (2010).** Wound healing potential of ethanolic extract of *Kalanchoe pinnata* Lam. leaf-A preliminary study. *Indian J. Experimental Biol.*, **48**: 572-576.
- Okwu, D.E. (2004).** Phytochemicals and mineral content of indigenous spices of southeastern Nigeria. *J. Sci.*, **6**: 30-37.
- Okwu, D.E. and Josiah, C. (2006).** Evaluation of the Chemical Composition of *Bryophyllum Pinnatum*. *J. Sci.*, **6**: 30-37
- Okwu, D.E. and Nnamdi, F.U. (2011).** Two novel flavonoids from *Bryophyllum pinnatum* and their antimicrobial Activity. *Pharmaceutical Chem. J.*, **3**(2):1-10.
- Olajide, O.A. (1998).** Analgesic, anti-inflammatory and antipyretic effects of *Bryophyllum pinnatum*. *Fitoterapia*, **69** (3): 249-252.
- Patil, R., Bhargava, Patel, P., Singh, K. and Surana, J. (2008).** Diuretic and anti urolithiatic activity of hydroalcoholic extracts of leaves of *Kalanchoe pinnata* pers. *J. Pharmaceu. Res.*, **7**(2): 87-91.
- Prasad, A.K., Kumar, S., Iyer, S.V. and Vaidya, S.K. (2012).** Pharmacognostical, phytochemical and pharmacological review on *Bryophyllum pinnatum*. *Internat. J. Pharmaceutical & Biological Archivves*, **3**(3): 423-433.
- Rossi-Bergmann, B., Costa, S.S., Borges, M.B.S., da Silva, S.A., Noieto, G.R., Souza, M.L.M. and Moraes, V.L.G. (1994).** Immunosuppressive effect of the aqueous extract of *Kalanchoe Pinnata* in mice. *Phytotherapy*, **8**: 399-402.
- Supratman, U., Fujita, T., Akiyama, K., Hayashi, H., Murakami, A., Sakai, H., Koshimizu, K. and Ohigashi, H. (2001).** Anti-tumor promoting activity of bufadienolides from *Kalanchoe pinnata* and *K. daigremontiana* x *tubiflora*. *Bioscience Biotechnol. Biochem.*, **65**(4): 947-949.
- Vaidhya, B. (2010).** Some controversial drugs in Indian Medicine. Edn 3, Chaukhambha Orientalia, Varanasi, 3-5.
- Veitch, N.C. and Grayer, R.J. (2007).** Natural Product Reports **21**:539-573.
- World Health Organization and Food Agricultural Organization of the United Nation Guidelines on Food Fortification with micronutrient. 26 December 2010 at the wayback Machine 2006 (cited on 2011 Oct 30).
- Yadav, N.P. and Dixit, V.K. (2003).** Hepatoprotective activity of leaves of *Kalanchoe pinnata* Pers. *J. Ethnopharmacol.*; **86**: 197-202.
- Yongasawatdigul, J. and Gunasekaran, S. (1996).** Microwave – vacuum drying of cranberries: Part II. Quality evaluation. *J. Food Processing & Preservation*, **20**: 145-156.

1<sup>st</sup> Year  
★★★★★ of Excellence ★★★★★