SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 11 | November 2024 - Peer Reviewed Journal

NUTRITIONAL VALUE ESTIMATION FROM BAMBUSA VULGARIS

Miss. Nalwade Anisha, Mr. Rathod Laxman
Department of Quality Assurance, Lokmangal College of Pharmacy, Wadala, Solapur ,Maharashtra ,India

ABSTRACT
Bamboo shoots (Bambusa vulgaris) are a high-nutrient plant used in traditional medical systems for treating diseases. Phytochemically, they contain carbohydrates, glycosides, saponins, alkaloids, flavonoids, phenolics, tannins, phytosterols, and triterpenoids. Ethnopharmacologically, they have analgesic, antipyretic, antidiabetic, anti-inflammatory, antioxidant, antiviral, anti-kidney stone, hepatoprotective, diuretic, and anti-anxiety properties.
KEY WORDS: *Bamboo, nutrients, glycosides, antioxidant, Tannins, Oxalate, phytate , antinutrients*

INTRODUCTION

One kind of open bamboo clump is called golden bamboo.
Originally from southern China's Yunnan Province and Indochina, this golden bamboo has been widely grown and naturalized in a number of locations. Bamboo gold is one of the biggest and easiest-to-identify species of bamboo. [1]The clusters that Bambusa vulgaris develops are not thorny and are rather loose. It features dark green foliage and lemon-yellow stalks with green streaks. The stems have thick walls, are initially tough, are not flexible, are not straight, and are difficult to split. Densely tufted stems are 4–10 cm thick and can reach heights of 10–20 m (30–70 ft). The trunk droops at the ends and can be either straight or flexible, bending alternatively in various directions. The walls of the trunk are fairly substantial. Nodes went up a little. It is 20–45 cm (7.9–17.7 in) long. From the center trunk node to the top, certain branches grow. The leaf blade is lanceolate and thin.[2]Bamboo young shoots have traditionally been consumed as a vegetable in many Asian nations and are said to be high in protein, fiber, carbs, and minerals while being low in fat and sugar.[3]It is stated that the shoots contain more nutrients than the majority of typical vegetables.[4]Bamboo is said to alleviate fever and regulate hydration in the body.[5]It has been discovered to have nutraceutical and antioxidant qualities, including enhancing bowel movement and reducing blood cholesterol.[6]

Determination of Proximate and Mineral Composition

Proximate composition was determined using standard methods according to AOAC as follows.After 5 g of the sample were dried at 105°C to constant weight, the moisture content was ascertained. Protein content was computed by multiplying the proportion of nitrogen by 6.25 and was ascertained using the semi-micro Kjeldahl technique. By utilizing petroleum spirit (b.p. 40–60°C) and Soxhlet's method, fat was extracted. After the extract was dried in an oven, the fat was measured gravimetrically. Five grams of the sample were burned at 550°C until the ash turned gray in order to measure the amount of ash. Two grams of the material were successively boiled under reflux in 1.25% H2SO4 and 1.25% NaOH to evaluate the fiber content. Following filtration, the residue was cleaned with ether and alcohol, dried, and then burned for one hour at 500°C. The weight difference between the pre- and post-incineration states was converted to a percentage of fiber content.By deducting the total of moisture, fat, ash, fiber, and protein content from 100, the amount of carbohydrates was found. Using a block heater to digest ground samples with H2SO4H2O2, the minerals were extracted, and the digest was then diluted to 50 milliliters using de-ionized water. A plasma spectrometer that was inductively linked was used to identify particular minerals[.7]

Determination of Total Polyphenols, Total Flavonoids and Antioxidant Activity

- Determination of Total Polyphenols

:The Waterman and Mole method was used to determine the total polyphenol content. Aqueous 50% methanol was used to extract ten milligrams of dry and ground material, which was heated to 80°C for an hour. Folin-Ciocalteau reagent was used to react one milliliter of the extract, and the absorbance at 760 nm was measured using gallic acid as the standard.[8]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 11 | November 2024 - Peer Reviewed Journal

-Sample Extraction for Flavonoids and Antioxidants

According to Harbone's instructions, the sample was extracted for the measurement of flavonoids and antioxidant activity. 100 milliliters of methanol were poured to 250 milliliter flasks containing five grams of the dry sample powder. After sealing the flasks firmly with parafilm and covering them with aluminum foil, they were shook for three hours. After being extracted for 72 hours in the dark, they were filtered, concentrated to 20 milliliters, and stored in tightly-sealed vials. These solutions were used to create working concentrations.[9]

-Quantitative Determination of Flavonoids

The Jagadish et al. method using aluminum chloride colorimetric method was employed to determine the flavonoids. 4 ml of distilled water and 1 ml of plant extract were added to a 10 ml volumetric flask. Then, 0.3 ml of a 5% sodium nitrite solution was added and allowed to stand for three minutes. Next, 0.3 ml of a 10% aluminum chloride solution was added and allowed to stand for five minutes. After adding two milliliters of 1 M sodium hydroxide, distilled water was added to raise the volume to 10 ml. Using a spectrophotometer set to detect absorbance at 415 nm, the amount of total flavonoids was determined by calculating the calibration curve of standards made from quercetin.
[10]

Determination of Free Radical Scavenging Activity

At 517 nm, the extracts' capacity to scavenge radicals was assessed against the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical. The extract was produced in methanol at concentrations of 0.01, 0.1, 1.0, 2.0, 5.0, and 10.0 mg/ml, and the results were expressed on a dry matter basis. At the same concentrations as the extracts, vitamin C served as the reference. 3.0 ml of methanol and 0.5 ml of 1 mM DPPH in methanol were added to a test tube containing one milliliter of the extract. Only methanol and DPPH were used to create a blank solution. Absorbances were measured after the mixture was left in the dark for half an hour. [11]

Determination of Antinutrients

As inositol hexa-phosphates, phytotates are found in plants and are known to form strong complexes with certain dietary elements, including proteins, zinc, and iron, reducing their bioavailability in the body and leading to health issues. The phytate content of the foreign and native species differed significantly ($p<0.05$), as Table 1 illustrates. The highest concentrations were found in B. vulgaris (2.7%), D. giganteus (2.4%), and Y. alpina (0.8%). Dongmeza et al. discovered that dried bamboo leaves contained 1.8–3.4% phytates.[12]

Tannins Content

Plant tannins are substances that resemble polyphenols and are present in fruits, vegetables, and seeds. They are known to bind proteins, which lowers the body's ability to use them. According to Wang et al. [13], the Fargesia yunnanensis bamboo species, which grows in China, contains up to 1.71% tannins. Table 1 displays raw shot values for the species examined in this study that were less than 0.03%. While other writers have recorded 0.1% in the same vegetable , Omobolanle reported 0.88% in fresh amaranthus. Given that tannins are soluble in water , boiling is expected to further lower their levels, which means that cooking may not have any negative health effects. [12]

Phytate Content

Inositol hexa-phosphates, or phytotates, are found in plants and are known to form strong complexes with dietary elements like zinc, iron, and proteins. This reduces the minerals' bioavailability in the body and can lead to health issues. Table 1 demonstrates that there was a significant difference ($p<0.05$) in the phytate content of the native and alien species. The highest concentration was found in B. vulgaris (2.7%), D. giganteus (2.4%), and Y. alpina (0.8%). Dried bamboo leaves contained 1.8–3.4% of phytates, according to Dongmeza et al. [12].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 11 | November 2024 - Peer Reviewed Journal

Table no.1Concentration of Tannins, Phytic Acid and Oxalates in Fresh Bamboo Shoots[12]

Bamboo species	Tannin content (% CE)	Phytic acid (%)	Oxalates (%)
B. vulgaris	0.024±0.001[a]	2.70±0.10[a]	1.2±0.1[a]
D. giganteus	0.030±0.001[a]	2.40±0.30[a]	1.0±0.1[b]
Y. alpina	0.007±0.001[a]	0.83±0.07[b]	0.7±0.0[c]

Data are presented as mean ± SD (n=3). Mean values within each column followed by different letters differ significantly at $p<0.05$. CE=Catechin equivalent.

Oxalate Content

Oxalic acid is a common component of most plants and is regarded as an anti-nutrient. It can be found in the form of a free acid, soluble potassium and sodium salts, and insoluble calcium, magnesium, and iron salts. Given that soluble oxalates seem to be more bioavailable than insoluble oxalates, the kind of oxalate salts found in diet may be significant.It has been claimed that oxalates have a minimum fatal dosage of 4-5%. [12]Table 1 ($p<0.05$) displays that there was a substantial difference across the bamboo species evaluated, with values ranging from 0.7% to 1.2%, and B. vulgaris having the highest value. In young shoots, Mukda et al. reported roughly 0.3%, but other authors discovered levels ranging from 0.1 to 0.69%.[14]

CONCLUSION

The study's findings demonstrate that the bamboo species' shoots are just as rich in significant macronutrients as those of edible species that are comparable. In particular, the grown ones have higher levels of calcium, magnesium, and zinc than other varieties that have been recorded from other regions of the world. High concentrations of flavonoids and polyphenols were discovered in the shoots, which suggested that they had a significant impact on human health as vital antioxidants. Therefore, bamboo can be used to combat malnutrition and food insecurity while also preserving good bodily health. Because the anti-nutrient levels in the shoots were often lower than in other popular vegetables, the body could receive higher-quality nutrients from the bamboo shoots.

REFERENCES

1. *https://en.wikipedia.org/wiki/Bambusa_vulgaris*
2. *Adila Fitri, Ridho Asra,Harrizul Rivai .I)College of Pharmacy (STIFARM), Jl. RayaSiteba Kurao Pagang, Padang, Indonesia. ii)Faculty of Pharmacy, Andalas University, Limau Manih Campus, Padang 25163, Indonesia*
3. *Nirmala, C., Madho, S.B., N., Sheena, H., "Nutritional properties of bamboo shoots: Potential and prospects for utilization as a health food", Comprehensive Reviews in Food Science and Food Safety, 10, 153-168, 2011.*
4. *Gopalan, C., Rmasastri, B.V., Balasubramanian, S.C.,"Nutritive value of Indian foods" Hyderabad, India, National Institute of Nutrition, 1971.*
5. *Duke, J.A., Ayensu, E.S., Medicinal Plants of China, Reference Publications, Inc., 1985.*
6. *Sarita, K.S., Vladimir, O., Riitta, J.T., Jingbo, J., Knell, D., Timo, V., Zhang, G., Xiong, Y., Pekka, N., "Phenolics from the culms of five bamboo species in the Tangjiahe and Wolong Giant Panda reserves, Sichuan, China", Biochemical Systematics and Ecology, 36, 758-765, 2008.*
7. *AOAC, Official methods of analysis, 16th ed., Association of Official Analytical Chemists, Washington, DC, USA, 1995.*
8. *Waterman, P.G., Mole, S., Analysis of polyphenolic plant metabolites, Methods in Ecology. Blackwell Scientific Publications, London, 238, 1994.*
9. *Harborne, J.B., Phytochemical methods, Chapman and Hall Ltd, London, 1973.*
10. *Jagadish, L.K., Krishnan, V.V., Shenbhagaraman, R, Kaviyarasan, V., "Comparative study on the antioxidant, anticancer and antimicrobial property of Agaricus bisporus imbach before and after boiling", African Journal of Biotechnology, 8, 654-661, 2009*
11. *Molyneux, P., "The use of stable free radical 1,1-dipheny-1-picryl- hydrazyl (DPPH) for estimating antioxidant activity",Journal of Science and Technology, 26, 211-219, 2004.*
12. *Paul N. Karanja1, Glaston M. Kenji, Simon M. Njoroge, Daniel N. Sila, Christine A. Onyango , Hiroshi Koaze, Naomichi Baba4 1 Food Science and Technology,Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya 2 Taita Taveta University College, Voi, Kenya 3 Food Science, Obihiro University of Agriculture and Veterinary Medicine, Obihiro, Japan 4 School of Bioscience and Technology, Okayama University, Okayama, Japan*
13. *Wang, S., Pu, X., Ding, Y., Wan, X., "Above ground biomass and bamboo shoot nutrients of high altitude bamboos (Fargesia yunnanensis Hsueh et Yi) from different sites in Yunnan province, China", Journal of Tropical Agriculture, 47 (1-2),48-53,2009.*
14. *Noonan, S.C., Savage, G.P., "Oxalates content in foods and its effect on humans", Asian Pacific Journal of Clinical Nutrition, 8, 64-74, 1999.*