



A comparative study on indigenous usage of Bambo shoot in the health care practices in NE India

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Abstract

In the recent years, naturopathy becomes more popular day by day for the treatment of human diseases due to the various side effects of synthetic medicines. NE region of India is the great treasurer of bio-resources especially in plant diversity and has become source of thousands of medicinal plants. Besides, it harbors a number of tribes of different ethnic groups having unique cultural heritage and have indigenous knowledge of using different plants to treat various physical ailments. Amongst such traditional knowledge, ethnobotanical usage of bamboo shoot play an important role in food habits, lifestyle, earn of living and health care of the tribes in this region. It is evident that bamboo shoots contain low cholesterol and fat contents but rich in potassium, carbohydrates, dietary fibers, phytosterol and have antioxidant and anti thyroidal properties. Therefore, a preliminary survey work was undertaken to study the usage of traditional knowledge of bamboo shoot in various health care practices among the people in certain places of north east with special emphasis on the tribal community. The work was carried out from March' 2010 to Feb' 2012 on the people, those who voluntarily participated in the programme, through standard questionnaire followed by personal interaction. The data obtained from surveys clearly depicted that bamboo shoots are widely used by the local tribes to treat various physical ailments such as stomach problem, wound healing, hypertension, kidney diseases and extensively for treating gynecological disorders. Data on the mode of usages and effectiveness were also recorded during the study period. The analysis of the present study revealed the ethnobotanical importance of bamboo shoot for the greater benefit of mankind. Therefore, a thorough epidemiological as well as experimental studies on nutraceuticals properties of bamboo shoot and its mechanism of action in vivo model are very much required.

Keywords : Bamboo shoot, Indigenous knowledge, Physical ailments, Tribal community.

1. Introduction

With the rapid modernization of the society, the use of harmful chemicals are increasing day by day through the various synthetic products without knowing of its detrimental effects. The unsound management and use of synthetic drugs possess threats to human being at many levels, though their impacts are often unknown or sometimes it is open to debate. Although, the synthetic medicines have a positive impact on quick recovery of physical ailments, but it may develop various side effects. Therefore, naturopathy

becomes more popular among the people day by day and emphasis is given on the use of indigenous knowledge of herbal medicine for curing different physical ailments. In India, the tradition of using plants for different physical ailments is about 400 years old. In Ayurveda, about 1400 plants are documented in various texts (Manohar, 2011).

Ethnobotanical information indicates that more than 800 plants are used as traditional remedies for the treatment of various diseases especially diabetes (Pushparay *et al.*, 2000). North

east India is one of the richest zone of plant diversity, many of them have medicinal importance. A number of tribes of different ethnic groups living in this zone have the traditional knowledge of using different plants as a herbal medicine for primary health care practices. Among such indigenously used plants is the bamboo plant, whose shoots form one of the essential ingredient in dishes of many South-East Asian countries including China, Thailand, Indonesia, Japan, Nepal and India. It is also very much popular among the tribal community in north east India. The shoot of this plant is consumed by the people of this zone in fresh form during the season of availability i.e. in the monsoon period and in fermented form during the rest of the year. The pickles made of bamboo shoot (BS) are commonly used in every household in this region and is used as a favourite ingredient in fish and meat preparation among the ethnic community. Reports showed that BS have low content in fats and cholesterol but rich in dietary fibres, potassium and phyto-sterols (Changtham *et al.*, 2011). It is also evident that BS have antithyroidal, antioxidant and scavenging activity of free radicles due to presence of rich phenolic contents (Jhon *et al.*, 2010).

Owing to possess a number of beneficial properties of BS as well as its extensive uses in different food items preparation have led to select BS as one of the potential source to access its impact on human health. Hence, a pilot project was undertaken to survey on the traditional knowledge of usages of BS for the treatment of various physical ailments and primary health care among the people of this region with special reference to tribal communities.

2. Study Area and Methods

A survey study was performed among the people in certain places of north east region viz. Kokrajhar, Kamrup, Nagaon, Dibrugarh, Dhemaji, Karbi Anglong, N. C. Hills, Dimapur, Manipur and Aizawl. A total number of 423 cases of people using bamboo shoots (BS) for various aspects were studied, each of them considered to be selected representative of the family. They were categorized into two major groups- group I

: tribes and group II: non tribes. The study was conducted from March' 2010 to Feb' 2012 among the people through standard questionnaire followed by personal interaction. Prior to investigation the details of the questionnaire and the intent of the study was clearly explained to the people in each cases who have voluntarily participated in this programme and consent was taken. The questionnaire used in this study contains a set of questions enquiring about frequency of consumption of BS using options i. frequent ii. regular iii. occasional, period of consumption, mode of consumption, cooking method, edible species of bamboo shoots and traditional usages of BS for treating various physical problems. A comparison was made between the tribes and non-tribes on the basis of usage of BS for primary health care.

3. Result

During the study period, a total of 423 cases of people were studied, out of which 249 were tribes and 174 were non tribes, the details of which are shown in Table 1. From the survey, it was found that BS are quite extensively used as an attractive food item among the different people in NE region and it was most popular with the tribes as compared to non-tribes. During the survey it was recorded that various tribal women in the villages of this region such as Chiru Koirao, Monsang of Manipur as well as Hamar, Dimasa, Kuki, Mar, Rankhol of N.C. Hill district are commonly associated with selling of BS as their profession (Plate I-D). It was also observed that four edible varieties of bamboo shoot generally growing in NE region are *Bambusa balcoa*, *Bambusa tulda*, *Bambusa pallida* and *Dendrocalamus hamiltonii*. Out of which *Bambusa balcoa* is mostly preferred for food preparation because of its appealing taste, softness and availability (Plate I-A,B). Regarding food preparation with BS, it was found that most of the tribal people have a general tendency to add BS in each and every dish they prepare as well as usually used as one of the most favorite ingredient in the preparation of meat (pork), fish and mushroom (Plate I-G). Whereas non-tribes people were found to consume pickles and curry made

of peeled BS (Plate I-C & Plate I-H) along with garlic and mustard seed (Plate I-I) that are colloquially called Khorisa and Kharoli. Again, both tribes and non-tribes were found to ferment and preserve BS in a canned form with salt (Plate I-E). BS are boiled by adding salts before cooking to remove its bitterness. The tribal communities mostly prefer fermented (Plate I-F) form of BS as it is more beneficial for health than the fresh one. In Aizawl and Manipur, fresh shoots are used as salads and healthy soup preparations. In Kamrup and Dibrugarh, BS are very much popular among the teenagers and it is extensively used in restaurants in various dishes such as smoked or steamed BS with meat and vegetables. During the study period it was also recorded that the tribes consume the BS frequently whereas the non-tribes consume it occasionally (Table 2).

Usage of bamboo shoot for health care practices were recorded predominantly among the tribal communities details of which are given in Table 3 & 4. Among the tribes, 30.52% people are found to use BS extensively to improve appetite and digestion. It was recorded that 17.27% tribal people belonging to different tribes especially Kuki, Thado, Rankhol and Mar use BS for wound healing and skin care and 7.63% of tribal people namely Rabha and Hamar use it to treat general weakness. The study also showed that 14.86% tribes belonging to Tiwa, Naga, Mizo, Singpho, Sonowal Kachari and Tea tribes use BS to control

high blood pressure and to treat various cardiovascular diseases. Usage of BS to treat menstrual cycle and gynecological related problems such as irregular menstrual cycle, heavy bleeding, dysmenorrhoea etc. were revealed by 11.65 % of tribal people of Missing, Khamti and Dimisa and they were found to have comparatively a healthy reproductive life. The non tribes people living with these tribal communities are also advised by the indigenous health practitioners to use BS to treat such kinds of menstrual cycle related problems. It was also found from the survey that 7.63% tribal people such as Bodo, Lalung, Tiwa, Thadou, Monsang and Aimoi tribes use BS to reduce labour pain and to prevent excessive blood loss during the postpartum period. According to them the BS causes abortion, therefore they advise not to eat BS during the 1st trimester of pregnancy. Similarly, 5.22% people of Lalung and tribes of Manipur also use BS to induce puberty in girls. Besides, 6.02% people of Tai, Mar, Biates and Kuki tribes were recorded to use BS to treat kidney diseases. Moreover, only 1.20% people of Garo tribes revealed their usage of BS against cancer. On the contrary to the extensive use of bamboo shoot for health care practices by the different tribal communities, non tribal people use the shoots of bamboo mainly for the purpose of food preparation and only in few cases BS was recorded to be used for skin care and wound healing.

Table - 1 : Shows distribution of total number and percentage of studied cases of people including both tribes and non tribes in different places of NE India

Name of place where survey conducted	Total No. of studied cases of people	% of studied cases of people	Total No. of studied tribal cases of people	% of studied cases of tribal people	Total No. of studied non-tribal cases of people	% of studied non-tribal case of people
Kokrajhar	39	9.22	23	58.97	16	41.02
Kamrup	48	11.35	22	45.83	26	54.17
Nagaon	36	8.51	14	38.89	22	61.11
Dibrugarh	49	11.58	26	53.06	23	46.94
Dhemaji	41	9.69	26	63.41	15	36.59
Karbi Anglong	43	10.17	29	67.44	14	32.56
N.C. Hills	39	9.22	23	58.97	16	41.03
Dimapur	46	10.87	29	63.04	17	36.96
Manipur	45	10.64	32	71.11	13	28.89
Aizawl	37	8.75	25	67.57	12	32.43

Table - 2 : Shows the frequency of consumption and mode of consumption of bamboo shoot among the tribes and non tribes in different places of NE region.

The place surveyed	Studied cases in Tribe/Non tribe	Time interval of bamboo shoot taken				Mode of consumption of bamboo shoot	% of frequent consumption
		Frequent eater	Regular eater	Occasional eater	Non-eater		
Kokrajhar	Tribes (Bodo) = 23	14	6	3	—	As an ingredient of meat preparation	60.87
	Non-tribe = 16	4	—	9	3	Pickle, curry with mustard seed	25
Kamrup	Tribes (Rabha, Bodo) = 22	11	4	7	—	As an ingredient of dry fish preparation and meat preparation	50
	Non-tribe = 26	11	—	6	5	Pickle, curry, as an ingredient of smoked/vapoured meat in restaurant	42.31
Nagaon	Tribes (Tea tribes, Tiwa, Lalung) = 14	9	2	3	—	Ingredient of mushroom fish and preparation (pork, pegi on)	64.29
	Non-tribes = 22	5	—	14	3	As an ingredient of meat preparation, pickles made from mixing khorisa and kharoli	22.73
Dibrugarh	Tribes (Missing), Sonowal, Kachari, Singpho, Deori) = 26	14	9	3	—	As an ingredient of dry fish, mushroom and meat (duck, pork) preparation, stir fry and served with body sauce and rice	53.85
	Non-tribes = 23	8	—	13	2	Pickles of khorisa and kharoli	34.78
Dhemaji	Tribes (Missing, Rabha, Tai Khamti) = 26	17	6	3	—	As an ingredient of Smoked/Vapoured meat, dry fish and mushroom preparation	65.38
	Non-tribes = 15	4	—	9	2	Curry, pickles	26.67

Karbi Anglong	Tribes (Tiwa, Dimasa, Thadou Hamar, Garo) = 29	15	6	8	—	As an ingredient of meat preparation, curry daal	51.72
	Non-tribes = 14	5	—	7	2	Pickles, stir fry	35.71
N. C. Hills	Tribes (Kuki, Thadou, Mar Biates, Dimasa) = 23	16	4	3	—	As an ingredient of dry fish and meat preparation curry, daal	69.57
	Non-tribes = 16	4	—	9	3	Curry, pickles	28.57
Dimapur	Tribes (Naga, Dimasa) = 29	19	7	3	—	Salad, as an ingredient of mush room and pork preparation, soup, juice	65.52
	Non-tribes = 17	4	—	11	2	Curry, as an ingredient of meat preparation	23.53
Manipur	Tribes (Aimoi, Chiru, Koirao, Monsang) = 32	21	9	2	—	As an ingredient meat preparation as vegetable with a bit of butter and pepper, soup, juice	63
	Non-tribe = 13	6	—	4	3	Pickles, curry	46.15
Aizawl	Tribes (Mizo) = 25	14	5	6	—	Salad, as an ingredient of fish and meat preparation, curry, soup, juice	56
	Non-tribes = 12	3	—	8	1	Pickles, soup	25

Table - 3 : Shows the total percentage of cases of tribes using bamboo shoot for different physical ailments and health care.

Name of the physical ailment	Name of the tribes	No. of tribal people	% of tribal people
To improve appetite and digestion	All the tribes studied	76	30.52
For wound healing and skin care	All the tribes studied	43	17.27
To control high blood pressure and other cardiovascular diseases	Tiwa, Naga, Mizo, Singpho, Sonowal Kachari, Tea tribes	37	14.86
To treat kidney diseases	Tai, Mar, Biates, Kuki	15	6.02
To treat menstrual cycle related problems	Missing, Khamti, Dimasa	29	11.65
To induce puberty in girls	Lalung, Aimo, Mansang	13	5.22
To reduce labor pain and heavy bleeding during postpartum period	Bodo, Lalung, Thadou, Mansang	19	7.63
To treat general weakness	Bodo, Rabha, Hamar, Dimasa	19	7.63
Against cancer	Garo	3	1.20

Table - 4 : Shows the comparative usages of bamboo shoot among the tribes and non-tribes in relation to general health and physical ailments.

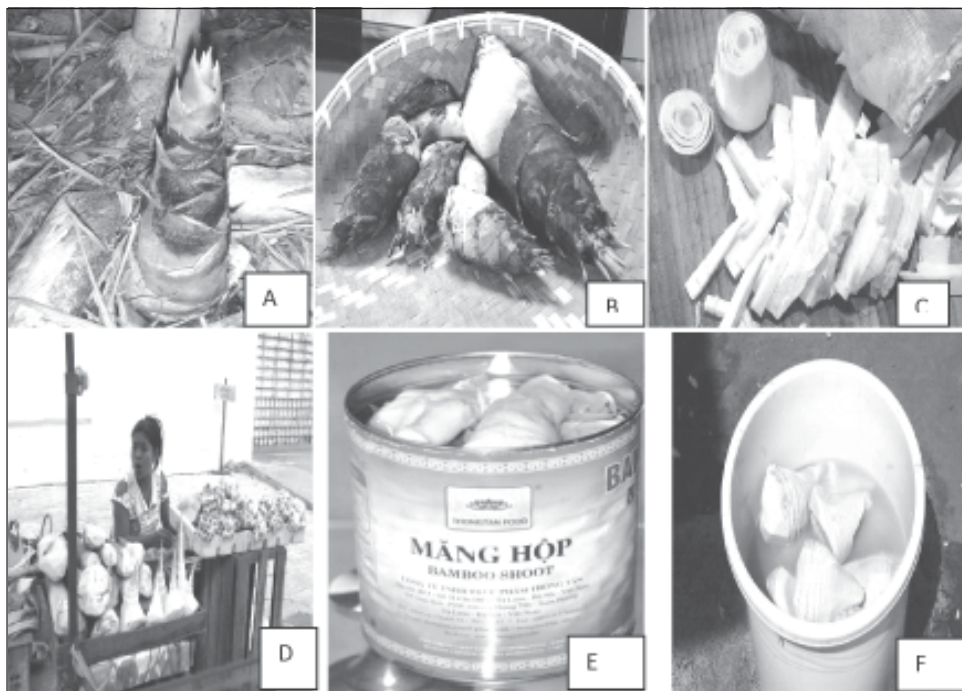
Name of place where survey conducted	Types of cases Tribe/Non-tribe	Total no. of studied cases of people	General health condition	Types of physical ailments for which bamboo shoot used	Total no. of people using bamboo shoot for various physical ailments
Kokrajhar	Tribes	23	Glowing skin, healthy reproductive life	To improve appetite and digestion	9
				To reduce labor pain and heavy blood loss during postpartum period	4
				To treat general weakness	6

				For wound healing	4
	Non-tribes	16	General weakness	Nil	
Kamrup	Tribes	22	Healthy	To improve appetite and digestion	13
				To treat general weakness	4
				For wound healing	5
	Non-tribes	26	Healthy	Nil	
Nagaon	Tribes	14	Slow rate of aging, healthy	To improve appetite and digestion	5
				To induce puberty	2
				To control high blood pressure	3
				For wound healing	4
	Non-tribes	22	Glowing skin	Skin care	6
				For wound healing	8
Nil				8	
Dibrugarh	Tribes	26	Healthy, glowing skin, Less no. of high B.P. patient	To improve appetite and digestion	9
				To control high blood pressure	11
				For wound healing	4
				To treat general weakness	3
	Non-tribes	23	Healthy, More no. of high B.P. patients		
				skin care	6
				Nil	17
Dhemaji	Tribes	26	Healthy reproductive life	To improve appetite and digestion	5
				To treat kidney Diseases	6
				To treat menstrual cycle related problems	9
				For wound healing	6

	Non-tribes	15	Glowing skin	Skin care	9
				Menstrual cycle related problems	4
				Nil	10
Karbi Anglong	Tribes	29	No general weakness, less no. of high B.P. patient	To treat menstrual cycle related problems	9
				To control high blood pressure	6
				To improve appetite and digestion	5
				Against cancer	3
				For wound healing	3
				To treat general weakness	3
	Non-tribes	14	General weakness, irregular menstrual cycle	To treat menstrual cycle related problems	4
			Nil	10	
N. C. Hills	Tribes	23	Healthy reproductive life, no general weakness	To improve appetite and digestion	6
				To treat kidney diseases	9
				For wound healing	5
				To reduce labor pain	6
	Non-tribes	16	General weakness	Skin care	4
				For wound healing	3
Nil				9	
Dimapur	Tribes	29	Healthy, less occurrence of cardiovascular diseases	To treat menstrual cycle related problems	11
				To control high blood pressure	6
				To treat general weakness	3

				To improve appetite and digestion	6
				For wound healing	3
	Non-tribes	17	Glowing skin, irregular menstrual cycle	Nil	
Manipur	Tribes	32	Healthy, glowing skin, slow aging	To induce puberty	11
				To reduce labor pain	9
				To improve appetite and digestion	8
				For wound healing	4
	Non-tribes	13	General weakness	Nil	
Aizawl	Tribes	25	Glowing skin, healthy, less problems regarding reproductive life	For wound healing	5
				To control high blood pressure	11
				To improve appetite and digestion	9
	Non-tribes	12	General weakness	Nil	

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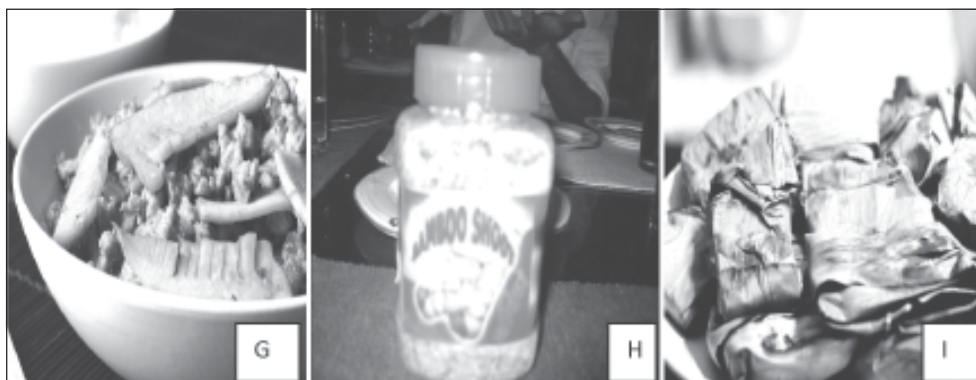


Plate I (A-I) : Showing different forms of bamboo shoot collected during survey period

- | | |
|---|--|
| A. Shoot coming out at the bottom of bamboo plant. | B. Bamboo shoot after being harvested (Bambusa Balcoa) |
| C. Peeled bamboo shoot for curry preparation. | D. Bamboo shoot on sale in the Manipur market. |
| E. Canned bamboo shoot for marketing | F. Fermented bamboo shoot with salt in Haflong. |
| G. Bamboo shoot with pork recipe. | H. Pickle of bamboo shoot. |
| I. Khorisa and Kharoli (fermented bamboo shoot with mustard cake) | |

4. Discussion

In the present day, altered life style, food habit and exposure to various xenobiotic components through synthetic products have resulted in an increasing trend of various physical ailments such as reproductive disorders, hypertension, obesity as well as cancer all over the world. Phytoremediation may be an effective measure to combat these problems. Therefore, plants are in high demand and are increasingly being used in most parts of the world as a source of medicinal ingredients. The basis of isolation of modern drugs from natural sources is totally based on the traditional use of plants for the treatment of various diseases by the local communities. Bamboo shoot is a very much popular food item in NE India and it possess a number of beneficial properties. The present study explored the extensive usage of bamboo shoot as food item as well as herbal medicine among the different tribes and non-tribes in relation to treatment of various physical ailments in NE India.

Findings of the survey clearly revealed that BS are widely used by the different tribes of this region to improve appetite and digestion. It is

also considered as a useful food item for healthy weight loss by the local tribes. Although BS are used traditionally, the properties of BS may help in maintaining the balance of various physiological processes of the body which maintains the balance of the body. The shoots may increase the gastrointestinal movement and blood circulation and thereby improving the efficiency of the digestive system. During the survey it was observed that the tribes have a general weakness for BS. It may be due to that the specific aroma coming out from BS creates an addiction to the tribal people for which they want to use it as an ingredient in most of the dishes they prepare. It is also evident that the shoots of bamboo contain low contents of fats and cholesterol but rich in dietary fibers (Sing *et al.*, 2011). Therefore, it may also be helpful in preventing the arterial thickening of the heart and maintain the blood pressure. People prone to high blood pressure are often advised to increase K intake and decrease Na consumption. The daily recommended K is 2.0 to 5.5 g/dl (Macgregor, 1987). Reports showed that the trace elements present in bamboo shoots includes potassium (K)

along with cadmium, cobalt, copper, nickel and magnesium (Singh *et al.*, 2011). Hence, shoots of bamboo may be labeled as a heart protective vegetable that helps to maintain normal blood pressure and a steady heart beat. The present study also revealed that a no. of tribes use BS to treat various reproductive health related problems such as irregular menstrual cycle, heavy bleeding, dymenorrhoea, to reduce labor pain and heavy blood loss during postpartum period and to induce puberty in girls as well as erectile dysfunction in men. Eight cases of teenagers showed striking relief after using BS as an indigenous treatment for such menstrual cycle problems. It was also recorded in the survey that the working women both tribal and non-tribal, who include BS frequently in their diet have less reproductive problems than the women who rarely take or never take BS in their diet. It may suggest that BS may act as an inducer of hormonal balance in the body which in turn play an important role in maintaining a healthy reproductive life. Earlier reports also support these findings that BS have antithyroidal properties (Chandra *et al.*, 2004). It is also evident that the BS have strong antioxidant properties and therefore they are capable of reducing excess oxidative stress which is one of the major cause of infertility in the present society (Sarangathem *et al.*, 2003). Moreover, the bamboo shoots have been considered as an essential food by some groups of tribes for the patients suffering from nephritis and diabetes. From the point of view of local tribes, BS have the effects of reducing and clearing the heat of the body, eliminating phlegm, quenching one's thirst and diuretic and laxative effects which is suitable for edema and other kidney disorders. Besides, the juice and soups of BS is considered as an effective measure to treat general weakness of the body. It may suggest that the shoots of bamboo may increase the strength of the body's immune system. Thus the shoots could be a functional food for the health conscious consumers conferring significant health benefits. In addition, a poultice of the shoot used by tribes such as Kuki, Thado and Rankhol

of Halflong and Mahur of N.C. Hill district is found to be a quite effective means for clearing the wounds and healing infected sores that indicates antimicrobial and anti inflammatory properties of bamboo shoot. This was also supported by earlier reports (Zhang *et al.*, 2010). Although only a few cases recorded use of bamboo shoot against cancer, recent reports revealed that bamboo shoots, both fresh and fermented, are a good source of phytosterols and possess anticancer effects. These are also reported to inhibit the production of carcinogens, invasion and metastasis and thereby promote apoptosis in cancer cells (Award *et al.*, 2011).

Analysis of the present survey work clearly revealed that bamboo shoot possesses a number of beneficial properties that have been used for the treatment of various physical ailments by the tribes. Therefore it is expected that more epidemiological studies and experimental works on neutraceutical properties of bamboo shoot and its mechanism of action in vivo model will bring to light the extensive beneficial properties of the juvenile bamboo shoots and their potential utilization as a health food.

5. Conclusion

Herbal medicine represents one of the most important fields of traditional medicine all over the world. To promote the proper use of herbal medicine and to determine their potential as sources for new drugs, it is essential to study medicinal plants, which have folklore reputation in a more intensified way. Therefore, a thorough investigation on traditional usages of bamboo shoot and its bioactivity and mechanism of action in vivo model is required. In turn, it may become a potential source for development of various pharmaceuticals drugs and can be established as a functional food for health benefits. If bamboo shoots are popularized as food and commercial production is taken up on a large scale, it will contribute enormously to rural economies and boost export earnings.

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