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Original Research Article

PRODUCTION OF TRADITIONAL BEVERAGE FROM PHLOGACANTHUS PUBINAVERUS T. ANDERSON

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Abstract: The study aimed to estimate the beverage of Phlogacanthus pubinaverus plant of the Acanthaceae family using the traditional techniques. Preparation of beverage using Hamei, a material made by mixing rice flour (Yam) with a bark of a tree called Yanglee (Albizia myriophylla Benth) was the traditional methodology of the Meitei community of Manipur. Maximum beverage production was found maximum in 5 hr fermentation with RH (85 ml).However, minimum beverage production was found least in case of 1 hr fermentation with PR (14 ml).The beverage production is also controlled by the quality of Hamei and found in an increasing trend maximum at 40g of Hamei with 220 ml of beverage then the production decreases. Hamei plays an important role in the production of alcoholic beverage (Atingba or Pupyu) of Meitei community of Manipur State, northeastern India.

Keywords: Alcoholic beverage, Phlogacanthus pubinaverus, Hamei,Albizia myriophylla,

INTRODUCTION

Phlogacanthus pubinaverus T.Anderson belongs to the family Acanthaceae, the local name Nongmangkha Angangba in Manipuri is an evergreen shrub. In Acanthaceae family there are about 229 genera and 3450 species (Teerakitchotikan et al., 2022). They are widely distributed in the tropical and sub-tropical regions of Himalayan. The genus Phlogacanthus is represented by 15-17 species which were found in India (Himalaya), Burma. Indochina, Malaya peninsular, Indonesia regions of the world with 10 species in sub- tropical India.

It is an ethno-botanical important plant for the Meitei community in Manipur. From time immemorial Acanthaceae species has been used as a traditional medicine for the treatment of different ailments. It has also been used as an unavoidable item of culinary (Suktani) in the ritual feast among the Meitei community. The plant forms an integral part of rites and rituals, myths, food items, taboos, medicinal, customs and tradition with the Meitei community. Folk medicinal uses are cold, cough, influenza, easy deliver of childbirth, abortion, irregular menstruation, diarrhoea, dysentery, cholera, high blood pressure, boils, smallpox, skin problems, sprains, body ache, constipation and burns (Ningombam and Singh, 2014).

The whole plant is extensively used for its great medicinal value. This plant has been known to possess antibacterial, antifungal, antidiabetic, anti-inflammatory, anti-cancerous, hypolipidaemic and hepatoprotective activity (Kumar et al., 2017). The most important of these bioative constituents present in plants are alkaloids, tannins, flavonoids, and phenolic compounds which were determined by doing the phytochemical tests of the extract, and it was responsible for inhibiting the growth of cervical cancer cells. i.e, HeLa cells (Kumar et al., 2017).

1.1. *Phlogacantus pubinervus*T.Anderson, First published in J. Linn. Soc., Bot. 9: 508 (1867) is under the family Acanthaceae. The native range of this species is Central Himalaya to China (Yunnan, Guizhou, Guangxi) and Myanmar. It is a shrub or tree and grows primarily in the wet tropical biome. The plants and plant parts were collected from varius locations as mentioned in various study sites of the state (Fig. 1).

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Fig. 1. *Phlogacantus pubinervus growing naturally in* Imphal East district of Manipur. .

1.2. Study sites and Collection and Selection of materials

Sudy sites were from different Districts of Manipur such as Gangluan Part IV (Noney District), Bishnupur Part III (Bishnupur District), Phayeng, Sabal Leikai (Imphal West District), Kachi Khul, Mayai Leikai, Sangaithel Road and Khongman Bashikhong (Imphal East) (Fig. 1).

The leaves, flowers and fruits of *Phlogacanthus pubinervius* (Nongmamgkha Angangba) were collected. Extraction of Juice from fresh leaves, dried flowers, fruits, and dried leaves of *Phlogacanthus pubinervius* were performed. Preparation of beverage using Hamei, a material made by mixing rice flour with a bark of a tree called Yanglee (*Albizia myriophylla* Benth) (Fig. 2).

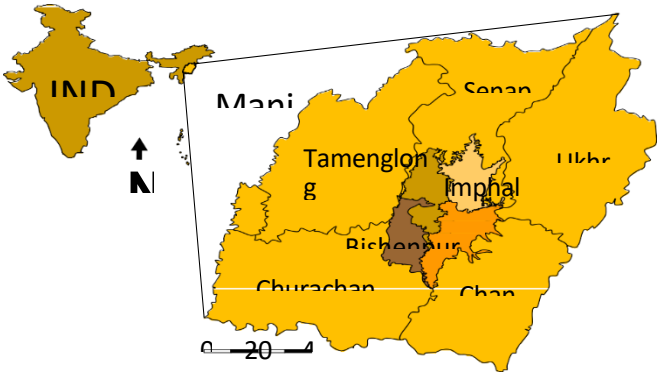

Figure 1. Location of Manipur State showing the study sites.

1.3. Method & Preparation of Hamei

For the preparation of *Hamei,* 500g of rice is socked in pure water for one whole night and allowed to dry for two hour in the shade by spreading .Then the half dried rice was grinned along with 20g of finely cut *Yanglee* (*Albizia myriophylla* Benth).Then it was mixed homogeneously to form a paste. The paste is allowed to dry over a mass of paddy husk and covered with straw and finally by thick cloths, for keeping the mass warm and free from extreme heat or cold. After 3-5 days of storage fermentation will soon begin. Fermentation will be completed when water droplets appear over its surface. Then it can be collected and air dried. The whole process is done in the dim light. *Hamei* is ready only when the alcoholic smell comes from it (Singh and Singh, 2006).

A B C

Figure 2. Preparation of Hamei: A. Preparation of plant material and powder rice, B. Drying of *Hamei,* C. Prepared *Hamei for use.*

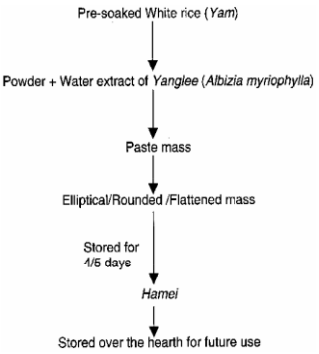

Figure 3. Flow chart of *Hamei* preparation.

RESULTS AND DISCUSSION

1.4. Alcoholic beverages are of two types:

(1) **Fermented beverages** - in which, ethyl alcohol is formed by the fermentation of sugar present either naturally in the source or produced by the transformation of starch, e.g. beer, wine and toddy.

(2) **Distilled beverages** – these are obtained by distilling an alcohol containing liquid that resulted from fermentation such as wine or fermented fruits juice and then further treating the distillate to obtain a beverage of specific character; also known as hard liquor, e.g. whisky, brandy, rum, gin, etc., (Murty and Subrahmanyam, 1989).

Preparation of beverage using Hamei, a material made by mixing rice flour with a bark of a tree called Yanglee (*Albizia myriophylla* Benth). In Manipur, from time immemorial, both fermented and distilled beverages had been prepared by fermenting different varieties of rice. The local liquor is prepared in different communities of Manipur, but restricted to the scheduled tribes and scheduled castes. The raw materials for such preparations are almost the same. For quality product and more alcohol production, *Hamei* (a fermented product) is added generally, because of its action as a starter/catalyst. Moreover, the preparation of *Hamei* is a popular domestic business for the people of scheduled caste and tribes, as it is also used as an ingredient of cattle foods. The traditional practitioners believe that, the quality of *Hamei* fermentation will be responsible for the quality and quantity of ethyl alcohol. Therefore, it is generally said that even a drop of sweat that falls over *Hamei* during its preparation will spoil the whole mass (Fig. 2, 3).

(3) **Preparation of *Hamei* (a fermented product)**

The different types of *Hamei*, viz. *Andro, Sekmai, Phayeng, Jiribam, Bishenpur,* and *Tengnoupal* are prepared using similar ingredients and methods except with the slight differences in shape, size and coverings during the process of fermentation. White rice of about 3 kg was pre-soaked for about half an hour and dried for 15 min to remove excess water. The white rice is prepared traditionally by poundingin a wooden mortar *(Shumban)* with a wooden mallet *(Shuk)* and the powder mass thus obtained is called *Yam*. Finely chopped or powdered about 250 – 300 gm dried bark of *Yanglee* (*Albizia myriophylla* Benth.) plant is mixed with required amount of water

and filtered. The filtrate obtained appears brownish in colour. A homogenous mixture paste is prepared by mixing *Yam* and *Yanglee* filtrate. From this paste mass, a cake like structure in the form of elliptical or rounded flattened mass is prepared known as *Hamei.* Pressing a small portion of paste mass in between the palms does the preparation of *Hamei* cake in the form of a flattened mass (Fig. 2). The shape, sizes and forms are changed according to the convenience of the practitioner. The prepared *Hamei* were stored for 4 - 5 days over a hearth for future use. For storage, the *Hamei* is kept over a mass of paddy husk or paddy straw and covered with straw and finally by cloths, for keeping the mass warm and free from extreme heat or cold. In winter, more layers of cloths are used. After 4-5 days of storage (fermentation), after fine water drop/droplets appear over its surface, it is taken out and air dried. The whole process is done under diffused or dim light. The *Hamei* is ready for use only when the alcoholic smell comes from it. The flavouring agents that developed during storage are – diacetyl, volatile phenols and esters (Prescott and Dunn, 1959, Lehtamen, 1982, Koizumi, 1974) .

Table 1.-Beverage production of *Phlogacanthus pubinaverus* using *Hamei*, by different treatments of *Hamei* and time of fermentation per 100 g of rice

Sl No	**Treatment**	**Fermentation For Beverage Formation (hr)**	**Beverage Produced (ml)**
1.		1	35
2.		2	51
3.	With 10 g	3	61
4.	*Hamei* (RH)	4	76
5.		5	85
6.	Without	1	14
7.	*Hamei* (PR)	2	27
8.		3	30
9.		4	40
10.		5	45

RH = Rice with *Hamei*; PR = Plain Rice (without *Hamei*)

Table 2.-Beverage production of *Phlogacanthus pubinaverus* using *Hamei*, by different quality treatments of *Hamei* per 100 g of rice

Sl No	**Quality of *Hamei* taken (g)**	**Beverage Production (ml)**
1.	5	90
2.	10	97
3.	15	110
4.	25	136
5.	30	150
6.	35	170
7.	40	220

DISCUSSION

Maximum beverage production was found maximum in 5 hr fermentation with RH (Rice with Hamei) (85 ml).However, minimum beverage production was found least in case of 1 hr fermentation with PR (Plain Rice without Hamei) (14 ml).The beverage production is also controlled by the quality of Hamei and found in an increasing trend maximum at 40g of Hamei with 220 ml of beverage then the production decreases (Table 1 and 2).

There are many opinions reported by many renown scientists who worked on the production of beverages and medicinal value of the products in a scientific way. Some of them are worth to be mentioned such as: Butu and Rodino (2019) opined that the exploitation of the synergies between raw materials as ingredients, processing methods, and product formulation will eventually lead to substantial innovations in the natural beverages industry. Depending on the processing technology, natural beverages may include juices or smoothies. They are produced with minimal processing and are usually consumed fresh, or soon after. Further they added that, the current worldwide research is pointed toward exploiting of plants. The producers from the beverage industry are oriented to respond to the emerging demand of natural beverages, as a result of therapeutic benefits that they provide beyond the basic nutritional properties.

The key role that food, in general and beverages, in particular, play in maintaining the quality of life, in prevention and treatment of chronic diseases. Consumers are more and more aware about the importance of high-quality beverages bringing health benefits, thus leading to increased consumption of natural products with proved functionality in preventing or inhibiting the progression of degenerative diseases caused by oxidative stress (Butu and Rodino, 2019).

Deori et al. (2023) reported that the leaves of Phlogacanthus thyrsiflorus are used as an anthelmintic remedy by the tribes of upper Assam. This study evaluates its toxic effects in laboratory bred mice and rats. Mice were orally dosed for 5 days, whereas rats were dosed for 28 days and variations in behaviour, feeding habits and blood parameters were recorded. The vital organs were processed for histopathology to observe any alternations from normal architecture. Further they opined that, no mortality or adverse toxic effects were manifested in this assessment. Evaluated parameters, namely feeding behaviour, body weights and relative organ weights, appeared to be similar to the control animals. Also, the haematological and serum biochemical parameters and histopathological studies revealed normal results. Conclusions The study indicates that P. thyrsiflorus may not be capable of causing toxic effects in mice and rats, and hence, its traditional use as an anthelmintic could be continued. However, other studies to further validate this may be carried out (Deori et al., 2023).

Teerakitchotikan et al. (2022) reported that species of Phlogacanthus, exhibited significant antioxidant activity and was comparable to genus Andrographis in terms of biomass yield and chemical properties. These findings lay the groundwork for creating future herbal remedies from local plants and their potential use in the medicinal industry.

Kumar, et al. (2017) reported that Phlogacanthus thyrsiformis plant has immense medicinal property. It is very commonly used as a folk medicine, anti-allergic, curing coughs and cold, chronicbronchitis, asthma, and rheumatism. Phytochemical screening was done for the water,methanol, and acetone extract. The most important of these bioactive constituents present in plants are alkaloids, tannins,flavonoids, and phenolic compounds which were determined by doing the phytochemical tests of the extract, and it wasresponsible for antibacterial activity. Antibacterial activity was studied by disc diffusion method. Silver nanoparticles were synthesized using green synthesis route of reduction of silver ions. Moreover, it was found to be effective in inhibiting thegrowth of cervical cancer cells, i.e., HeLa cells.

Phytochemical extracts were found antibacterial, and it was alsofound to be effective in inhibiting the growth of cervical cancer cells, i.e., HeLa cells. In current finding, phytochemicalextracts derived from Nongmangkha leaves have shown as anticancerous agents. Conclusion: It has been suggested that P. thyrsiformis (Nongmangkha) can be explored as green drug development for antibacterial and anticancerous agent (Kumar, et al., 2017).

Conclusion: Manipur State has rich wild vegetable resources. However, many of them are seldom collected or cultivated given their importance in sustaining and diversifying diet. A comprehensive assessment indicated that majority of these plants have high value. Priority species require further research into their nutritional components to understand the potential as a source of future food and nutritional security. They should be promoted for integration into the agricultural system and income generation for local sustenance. Hamei prepared with Yanglee (Albizia myriophylla Benth) plays an important role in the production of alcoholic beverage (Atingba or Pupyu) of Meitei community of Manipur State, northeastern India.

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