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Ushoi kangshu - A traditional bamboo shoot salad of the *Meiteis* of Manipur

Yengkokpam Ranjana Devi* and Amrit Chakma

College of Agricultural Engineering and Post Harvest Technology,
Central Agricultural University, Gangtok-737 135, Sikkim, India.
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ABSTRACT

Ushoi kangshu is a fiery traditional seasonal delicacy of the *Meiteis* of Manipur, India prepared from fresh bamboo shoot. The main ingredients being fermented fish, chillies and peas. The preparation method is a traditional art which is handed over from generation to generation. Bamboo shoots are low in calories, high in dietary fiber and rich in various nutrients like protein, carbohydrates, amino acids, minerals, fat, sugar and inorganic salts, however, bamboo shoots are known to contain plant toxins (cyanogenic glycosides) which are harmful to human health. Studies on the cyanogenic content shows that the toxin is present in high concentration (600mg/kg) in the fresh bamboo shoot however, the concentration of the toxic compound is decreased step wise (400mg/kg to 160mg/kg) during the preparation of *ushoi kangshu* and is completely removed at the final step of preparation. More over it was observed that this ethnic bamboo shoot salad is highly nutritious due to its garnishing with locally available herbs which has medicinal and therapeutic values.

Key words: Bamboo shoot, Cyanide, *Meiteis, Ushoi kangshu*.

INTRODUCTION

Manipur located in North East India is bounded by Nagaland in the North, Mizoram in the South, Assam in the West and Myanmar in the East. The state is inhabited by various ethnic groups of which the *meiteis* form the primary ethnic group constituting about 60% of the population residing in the valley areas. Since time immemorial various traditional foods have been prepared and consumed by the *meiteis*. Bamboo shoot (locally known as *ushoi*) is a wild food resource which is used as traditional delicacy by the ethnic people since time immemorial. They are consumed fresh, fermented or pickled. One such traditional seasonal delicacy is the fresh bamboo shoot salad locally known as *Ushoi kangshu*. Bamboo shoots are low in calories, high in dietary fibre and rich in various nutrients like protein, carbohydrates, amino acids, minerals, fat, sugar and inorganic salts (Shi and Yang, 1992; Ferreira *et al.*, 1995; Nirmala *et al.*, 2007, Debangana *et al.*, 20010; Nirmala *et al.*, 2011), however, bamboo shoots are found to contain high amount of natural plant toxin, the cyanogenic glycosides specifically taxiphyllin (Haque and Bradbury, 2002). These toxic substances when ingested in significant amount or when they are not processed appropriately can be potentially harmful to human health thereby causing food poisoning. Cyanogenic glycosides are nitrogeneous phytoanticipins and are used by various plants as effective defensive mechanism against predators (Zagrobelny *et al.*, 2004). Cyanogenic glycoside is not toxic on its own. However, when cell structures of a plant are disrupted, cyanogenic glycoside will be brought together with the corresponding b-glucosidase enzyme. It will be subsequently broken down to sugar and a cyanohydrin which rapidly decomposes to an aldehyde or a ketone and releases the toxic hydrogen cyanide. The HCN, so formed, inhibits the enzyme cytochrome oxidase which then stops the oxidative phosphorylation process and utilization of intracellular oxygen ceases and causes cardiac arrest in human body (Moller and Seigler, 1999). It happens when the plant is chewed releasing the toxic cyanide to the predator. In the same way, toxic cyanide is released when the plant is cut into small pieces during food preparation. The concentration of HCN recommended by WHO for cassava flour is 10ppm and concentration of 100ppm is regarded lethal for humans (JECFA, 1993). The present study was undertaken to estimate the HCN content in *ushoi kangshu* and to determine whether this salad is fit for human consumption.

MATERIALS AND METHODS

Preparation method of bamboo shoot salad (*ushoi kangshu*): Fresh bamboo shoot (local name: *Ushoi Saneibi*) identified as *Bambusa tulda* was obtained from the market. The preparation method of *ushoi kangshu* is a household art which is handed over from generation to generation. Fig. 2 to Fig. 11 shows the preparation procedure. The overlapping sheaths that tightly clasped the young shoots are removed to extract the edible part. The shoots are washed and then chopped into slices. In a container the sliced shoots are soaked for some time. In another container, some dried peas (local name: *mangan*) is also soaked for some time (preferably overnight). The dry peas, *ushoi* and chilli (dried red ones are preferred) is then cooked together with little water in a pressure cooker for two whistles. The steam is let out and the water is drained out from the pressure cooker.

*Corresponding author's e-mail: y_ranjana@yahoo.co.in.

The contents are allowed to cool. The cooked bamboo shoot is then squeezed dry by clasping tightly between the hands. The cooked peas are toasted in a heated pan till they are dry and is pounded coarsely in a mortar. The fermented fish (local name: *ngari*) is roasted on fire until done. The roasted fermented fish, salt and the chillies are blended together. It is then again blended together with the pounded peas into a coarse mixture. The blending can be done by hand or a pestle. The squeezed bamboo shoots are then mixed thoroughly with the above mixture. The mixture is than garnished with sliced locally available herbs like *Coriandrum sativum* (local name *phadigom*), *Houttuynia cordata (*local name *toning khok*), *Ocimum americanum (*local name *mayangton*), *Allium sp* (spring onions), *Allium odorum* (Local name *maroi naakuppi)* and *Elsholtzia communi* (local name *lomba*). In some households, dried shrimps are roasted until crisp and is mixed with the above mixture. It is a delicious salad even though fiery is beautifully tempered with nutritional and digestive herbs. It is served as an accompaniment with meals.

Analysis of cyanide content: The cyanogenic content of the bamboo shoot was analysed by picrate paper procedure (Egan *et al.*, 1998).The method was performed with the help of cyanide analysis kit. 25 mg of the bamboo shoot was grounded in a pestle mortar and placed in a flat bottomed plastic bottle. Immediately 0.5 mL of 0.1 M phosphate buffer (at pH 6) was added and mixed together. Immediately a yellow picrate paper attached to a plastic strip was added in the bottle and closed tightly. Another sample was prepared as above but with no bamboo shoot, to serve as a blank. As a control to check on the method, a whatman filter paper disc loaded with buffer and linamarase in a bottle was placed one upon another and a pink linamarin paper was added. To it 0.5 mL water and a yellow picrate paper was added. Immediately the bottle was closed with a screw cap lid. The bottles were allowed to stand for 16-24 hour at room temperature (20-35°C). The plastic backing sheet was carefully removed from the picrate paper. The picrate paper was immersed in 5.0 ml of water for 30 min with occasional gentle shaking. Absorbance at 510 nm of the picrate solution was read against blank. The total cyanogen content in ppm was calculated as total cyanogen content (ppm) = 396 x absorbance x 100 / z. where z is the weight of ground up bamboo shoot taken. . Three triplicates for each experiment were performed. The same process was repeated with the bamboo shoot obtained from the different stages of salad preparation *ie*. with the soaked, pressured cooked and squeezed bamboo shoot .

RESULTS AND DISCUSSION

Results show that the concentration of hydrogen cyanide is decreased step wise during the preparation of *ushoi kangshu* and is completely removed at the final step of preparation (Fig 1). The cyanide content in fresh bamboo shoot was found to be 600 mg/kg. After soaking for some

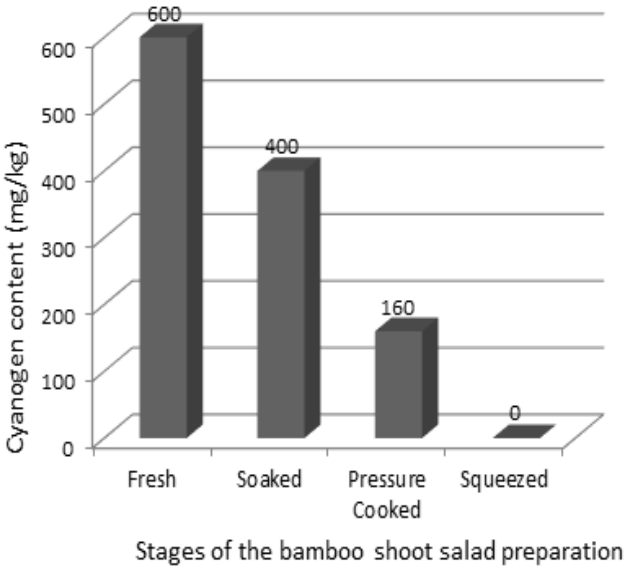

FIG 1: Cyanogen content (mg/kg) of bamboo shoot during the different stages of *Ushoi Kangshu* preparation.Values are mean of three replications.

time in water (approx 1 hr), the cyanide content was found to reduced to 400 mg/kg. However after pressure cooking for the preparation of *Ushoi kangshu* , the level of cyanide drastically reduced to 160 mg/kg. After squeezing of the cooked bamboo shoot, the cyanide content of the food could not be detected and hence is completely removed. A WHO report in 1993 (JECFA) states that the concentration of cyanide in bamboo shoot can be as high as 8000mg/kg in the tips. Other investigators have reported different cyanide concentration in different types of bamboo shoot and it was found that the concentration of cyanogenic glycosides varies widely as a result of genetic and environmental factors,

FIG 2: A bamboo shoot in its natural habitat

FIG 3: Removal of the outer sheaths of bamboo shoot (*Ushoi*)

FIG 4: Edible portion of bamboo shoot

FIG 5: Slicing of bamboo shoot

FIG 6: Soaking in water

location, season and soil types (JECFA, 1993, Ermans *et al.*, 1980). The cyanogen in bamboo, is taxiphyllin (which is a p-hydroxylated mandelo-nitrile triglochinin), one of the few cyanogenic compounds that decompose quickly when placed in boiling water. Bamboo becomes edible because of this instability (Nahrstedt, 1993). It is also reported that processing techniques like slicing, soaking, steaming, boiling, drying, fermentation *etc*. eliminates the toxic compound to a great extent (Satya *et al.*, 2010).

From the present study it can be concluded that *Ushoi kangshu* is a highly nutritious food because of complete absence of the cyanogenic glycosides and also due to reported high content of dietary fibre, low in calories, and rich in various nutrients like protein, carbohydrates, amino acids, minerals, fat, sugar and inorganic salts (Shi and Yang, 1992; Ferreira *et al.*, 1995; Nirmala *et al.*, 2007, Debangana *et al.*, 20010; Nirmala *et al.*, 2011) . In addition, the seasoning of the salad with traditional herbs increases the nutritional value of the food. *Houttuynia cordata* is used in folk medicine for diuresis and detoxification and as a herbal medicine for its antiviral, antibacterial and antileukemic activities and very recently this herb has been studied for its anti-obesity properties (Miyata *et al.*,2010). In Japan, the beverage *dokudami cha* (*Houttuynia cordata* tea) is made from the dried leaves and is widely used as a general detoxification for ridding the

FIG 7: Main ingredients used in the preparation (fermented fish, soaked peas, chillies, different herbs)

FIG 8: Cooked bamboo shoot and peas

FIG 9: Squeezing of the cooked bamboo shoot

FIG 10: Herbs used for garnishing

body of harmful bacteria. *Elsholtzia communis* is used as tonic, astringent, carminative and antiseptic. Decoction of leaves and flowers is given in tonsilities, fever, cough, high blood pressure, nose bleeding, menstraual disorder, treatment of body itching (Singh *et al*., 2003, Singh, 2007). *Allium odorum* is used as folk medicine in the treatment of fungal or bacterial infection. Study of extracts of 7 Allium plants sowed that they posses antifungal activity against three *Aspergillus* species: *A niger, A flavus and A fumigates* (Mei-chin and Shih-ming, 1999). The fresh leaves and bulbs are also used as antiseptic and also as diuretic. The plant is also used for the treatment of hemolytic anemia and insomnia. *Ocimum americanum* is also used as a herbal remedy. It has anti-asthmatic properties and is used for treatment of colds. An infusion of this herb is also used to ease the symptoms of diabetes. *Coriandrum sativum* like many spices contains antioxidants which can delay or prevent the spoilage of food seasoned with this spice. Chemicals derived from coriander leaves were found to have antibacterial activity against *Salmonella choleraesuis.* Coriander has been used as a folk medicine for the relief of anxiety and insomnia. It is also used as a diuretic,

FIG 11 : Bamboo shoot salad (*Ushoi Kangshu)*

carminative and as a digestive aid (Wangensteen, 2004; Kubo *et al.*, 2004; Eidi *et al.*, 2009)

Even though there was no scientific studies during the times of our forefathers they knew about the toxicity of fresh bamboo shoots and hence had devise the step wise procedure for the removal of toxic compounds from the prepared food. Moreover to combat the fiery flavour of the salad, it is garnished with nutritive and digestive herbs. The wisdom of using food processing methods by our forefathers are unique and scientifically advanced way ahead of their times to ensure the good health of the community for which the present population is highly indebt to them.

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