



PROCESSING OF BAMBOO SHOOT



AATMANIRBHAR BHARAT

**PM Formalisation of Micro Food Processing
Enterprises Scheme (PM FME Scheme)**

INTRODUCTION

Kingdom : Plantae

Order : Poales

Family : Poaceae

Subfamily : Bambusoideae



- Bamboo shoot is the new tender growth of young culm from the rhizome apex having compressed internodes which are protected by numerous leathery sheaths.
- The natural distribution of bamboo encompasses mainly the tropical, subtropical and mild temperate zones of worldwide.

INTRODUCTION

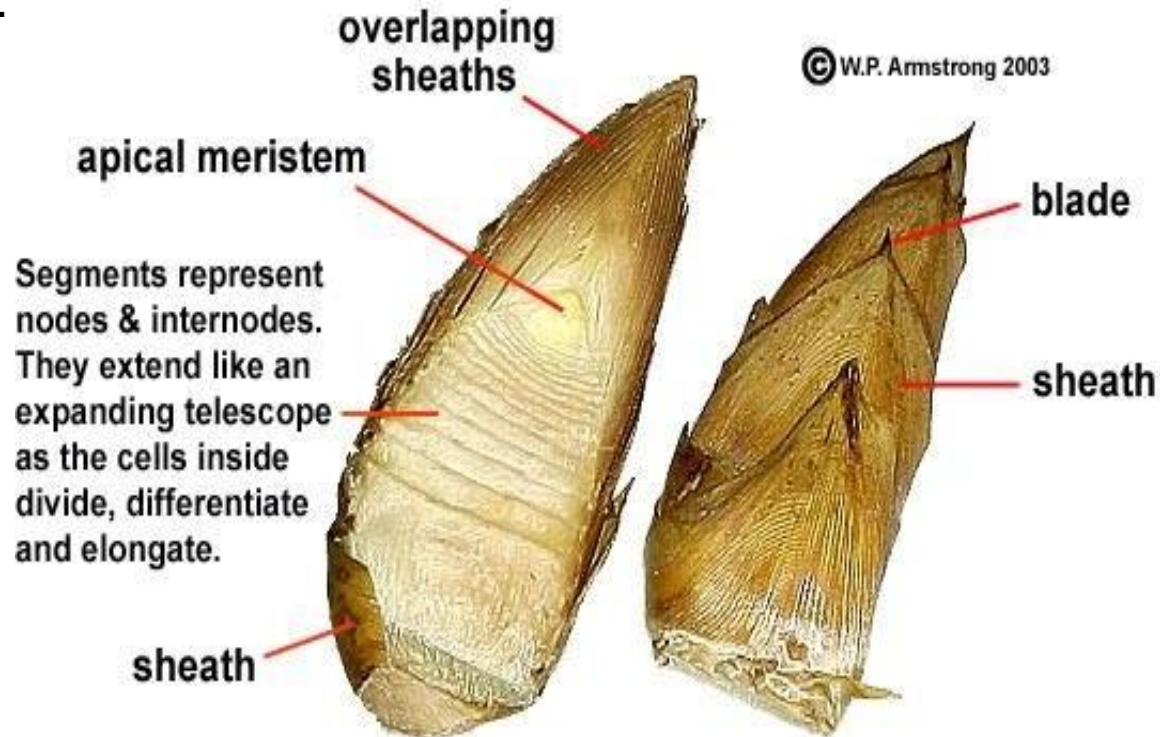
- Bamboo shoot is the new tender growth of young culm from the rhizome apex having compressed internodes which are protected by numerous leathery sheaths.
- There are more than 1,250 species which belong to 75 genera worldwide, indeed India has more than 125 species belonging to 23 genera.
- Examples: *Dendrocalamus strictus*, *Bambusa bambos*, *Bambusa nutans*, *Bambusa tulda*, *Dendrocalamus giganteus* and etc.
- The shooting period of bamboo varies species to species.
- Runners are the temperate climate bamboos which shoot in the spring and clumpers which shoot in the late summer and fall which belong to tropical and subtropical regions.

INTRODUCTION

- Bamboo shoots are highly nutritious and a great source of dietary fibers, carbohydrates, antioxidants, amino acids, minerals, vitamins, protein, low in calorie and fat content, but rich in essential fatty acids with health beneficial properties.
- The health beneficial properties bamboo shoot possesses are anti-inflammatory, anticancer, antibacterial, antifungal, and antiviral properties etc.
- The whole bamboo shoot consists of three parts, sheath, tender bamboo shoot, and basal bamboo shoot.

INTRODUCTION

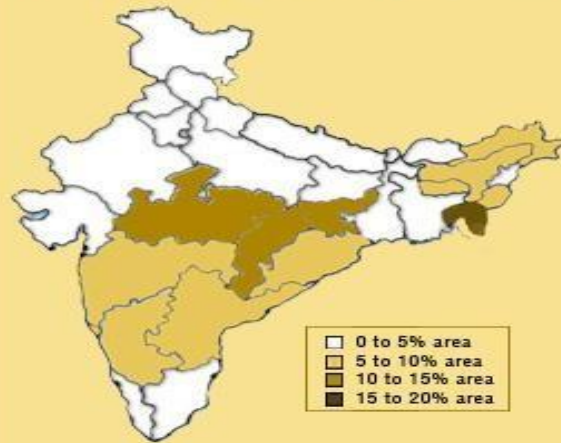
- The edible part consists of meristematic cell tissue with regions of rapid cell division and differentiation, which is enveloped in protective, non-edible leaf sheaths.



A Bamboo Shoot Sectioned Lengthwise

INTRODUCTION

Bamboo growing areas in India



→ 28% of area and 66% of growing stock of bamboo in NE region







→ 20% of area and 12% of growing stock in MP & Chattisgarh

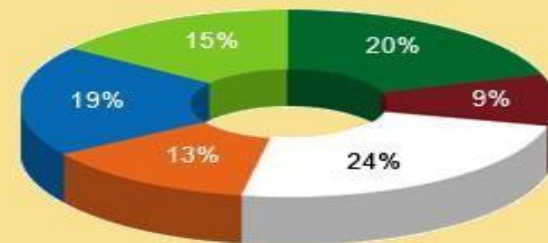
Availability of Bamboo

Growing Stock: 80.43 m MT, Collection: 13.5 m MT Area: 8.96 m ha

S No.	State/region	Area %	Growing stock %
1	North East	28.0	66
2	Madhya Pradesh	20.3	12
3	Maharashtra	9.9	5
4	Orissa	8.7	7
5	Andhra Pradesh	7.4	2
6	Karnataka	5.5	3
7	Others	20.2	5

Current Usage of Bamboo

 Paper	2.5 M T
 Internal Consumption	1.35 M T
 Scaffolding	3.40 M T
 Illegal exports to BD & Myanmar	1.7 M T
 Handicrafts	2.55 M T
 Miscellaneous	1.97 M T



Source: National Bamboo Mission

SELECTION OF RAW MATERIALS AND HARVESTING

- ❑ The temperate climate bamboo species are known as runners, which shoot in the spring season and the tropical and subtropical bamboo shoot species are called as clumpers, which shoot in the late summer and fall.
- ❑ Shooting period of sympodial bamboo is May to October with most production is in July to August.
- ❑ Bamboo shoot should be selected for consumption before it is becoming tough and free from diseases, insect damage or any mechanical damage before and after harvest.
- ❑ Bamboo shoots can be selected for harvesting at any age base on processing different products and generally it is harvested at the time of June and July when the shoots are of 30 cm in height

SELECTION OF RAW MATERIALS AND HARVESTING

- ❑ Example : for preparing fermented dry bamboo shoot product around 1.3-1.5 m in height bamboo shoot is selected.
- ❑ Generally for processing bamboo shoot high of 15-30 cm is selected for harvesting.
- ❑ Different species shows variation of nutritional composition based on harvesting age.
- ❑ For example : according to some research, after emergence from the ground the optimum harvesting age for shoots of *D. asper*, *D. strictus* and *B. tulda* was on 10 to 14 days, 6 to 10 days and 10 to 16 days respectively.

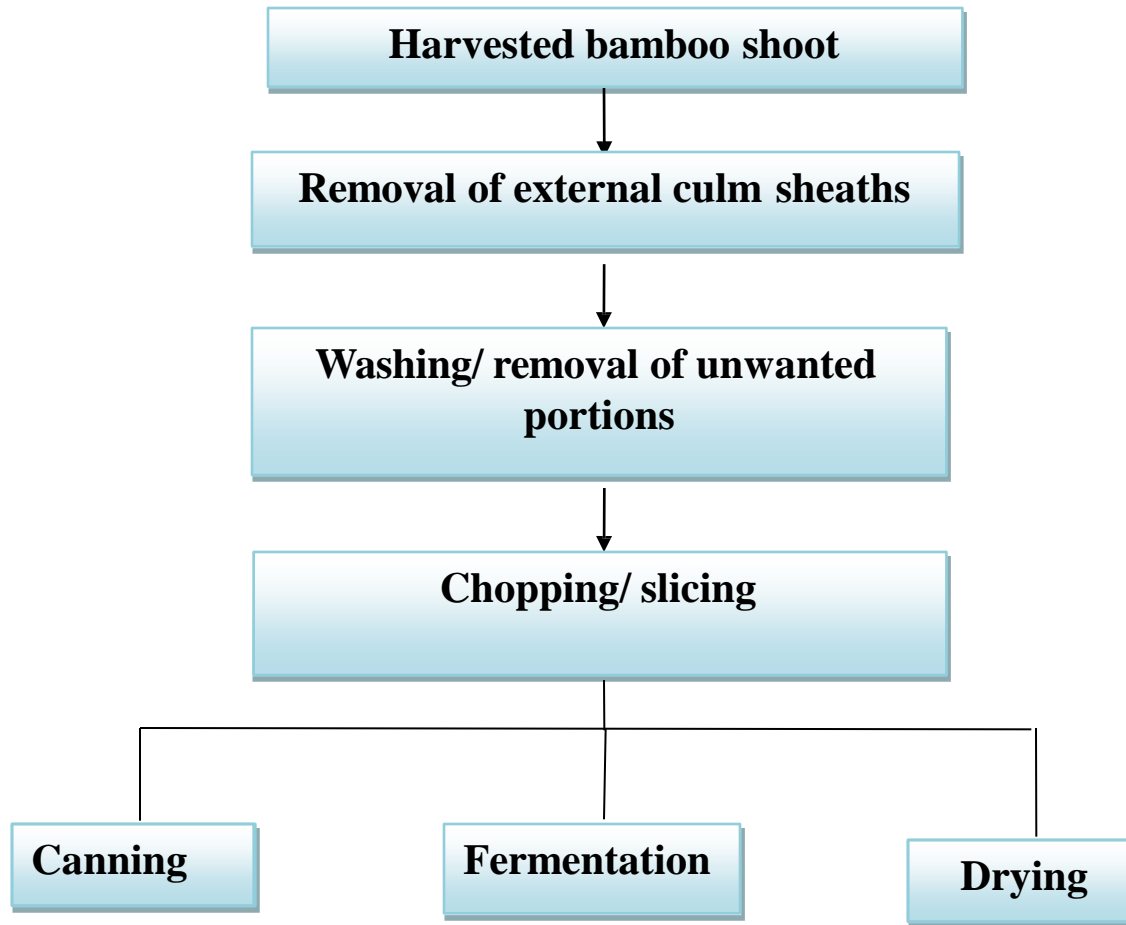
SELECTION OF RAW MATERIALS AND HARVESTING

- ❑ Harvesting at morning hours helps to reduce the water loss due to transpiration and evaporation.
- ❑ Generally early morning and late evening are best for harvesting bamboo shoots.
- ❑ While harvesting, first it is better to dig around the base of the shoot and after harvesting need to cover the dug area with soil.

POST-HARVEST MANAGEMENT OF BAMBOO SHOOT

- After harvesting, bamboo shoot can be degraded very rapidly due to different chemical changes, enzymatic degradation; microbial spoilage etc. and bamboo shoot itself contains antinutrients (cyanide), which is necessary to remove before consumption.
- There is a need for some pretreatments for removal of bitterness/ cyanide from bamboo shoot before proceeding to any particular consumption process.
- Different internal and external factors such as enzymes and moisture of bamboo shoot, storage condition such as temperature, microorganisms, and the means of storage can impact on the nutritional contents as well as shelf life of bamboo shoot. In this case, processing helps to retain its quality.

PROCESSING OF BAMBOO SHOOT



General primary processes of bamboo shoot

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

Cleaning, peeling and cutting:

- ❖ After harvesting, cleaning of bamboo shoot is done to remove soil and other dirt.
- ❖ For further processing there need to peel out the other outer scaly layers until we get close to the soft edible core.
- ❖ The soft inner-core of the bamboo shoot can be cut longitudinally or perpendicular based on our requirements. In other words, it is chopped and sliced.

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

Pretreatment:

- ❖ Pretreatments are important before consumption of bamboo shoot as it contains some antinutritional properties such as **Cyanoglycosides (Taxiphyllin)**.
- ❖ Due to consumption of cyanide general sickness, diarrhea, goiter, muscle weakness and other respiratory, nervous and gastrointestinal problems can occur.
- ❖ Different pretreatments for removal antinutrients are of boiling, blanching, steaming and soaking in water etc.
- ❖ People of Arunachal Pradesh, uses banana leaves to semi-ferment the bamboo shoot and pressed by stones by keeping it near water stream for 3-4 months. This removes bitterness from bamboo shoots.

General processing methods of bamboo shoots

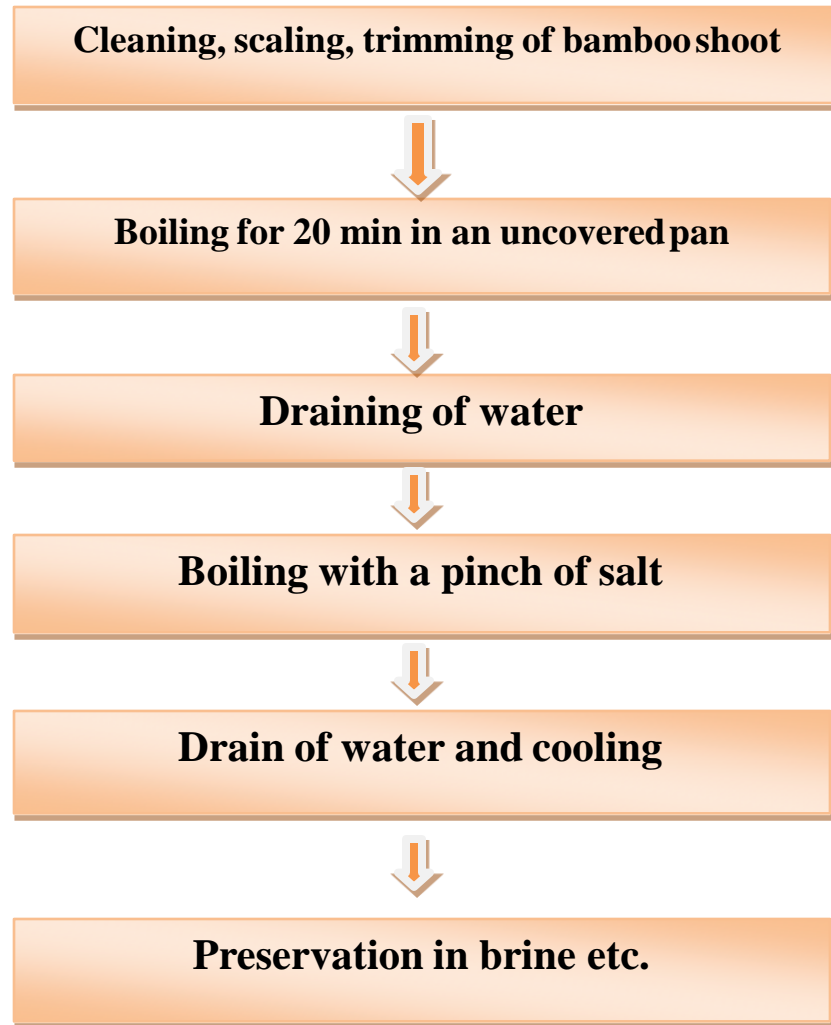


Fig: A general method of removal of hydrogen cyanide from bamboo shoot

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

Processing of bamboo shoots:

- ✓ Processing methods are basically adopted to preserve the bamboo shoots so that they could be used for a longer time.
- ✓ Different processing methods for bamboo shoots are fermentation, roasting, boiling, blanching, pickling, canning, etc.
- ✓ In other words, preservation methods of bamboo shoot are storing in brine solution (e.g. 5% salt and 1% citric acid in 100 ml), drying, osmotic dehydration, fermentation, canning, pickling, freezing, or heating etc.

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

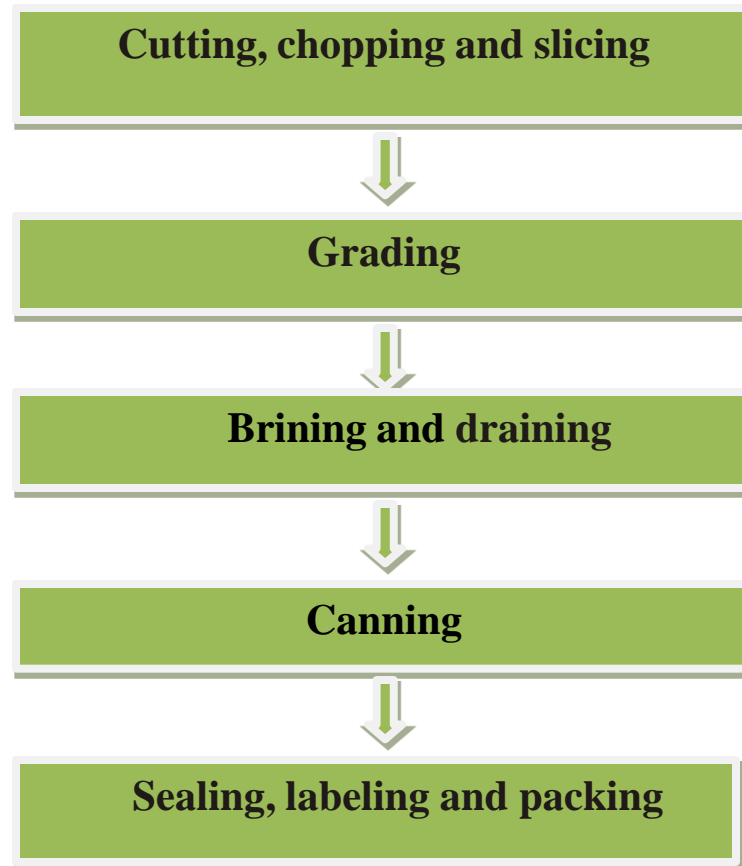
✓ **Drying:**

- Some drying methods which are generally used are sun drying, oven, freeze and superheated steam, hot air drying, vacuum freeze drying (FD) etc.
- In some researches some optimized advanced drying such as drying in a cabinet dryer (at 60 °C for 7 to 8 h), two-stage hybrid method of drying: hot airflow drying followed by vacuum freeze drying (AFD), reverse of the process i.e. vacuum freeze drying followed by hot airflow drying (FAD) was adopted.

✓ **Refrigeration:**

- In case of refrigeration, generally bamboo shoots can be stored up to 2 weeks.

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS



Flowchart of Canning of bamboo shoot

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

- After harvesting the bamboo shoot is cut from head and tail and also removes the outer unwanted layers.
- After that the tender bamboo shoot is cleaned with water and then chopped or sliced and grading is done.
- The bamboo shoot pieces are boiled (brining) and drained and then canned. In this can salt solutions are added and allowed to evaporate.
- Finally, the cans are sealed and processed (retort, 100- 120 °C).
- After cooling the cans it is labeled and packed. Canning and retort input output ratio could be 100:85 and is around 2 days of process time.

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

Fermentation:

- Fermentation is one of the popular methods for preservation of bamboo shoot.
- Different communities of India ferment the bamboo shoot in different ways. In Manipur the fermented bamboo shoot is known as Soidon, Soibum and Soijim.
- ❖ **SOIBUM:** Soibum is a popular fermented product of bamboo shoot. It can be prepared in 2 ways such as Khongkhang/ Kwatha type and Andro type.

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

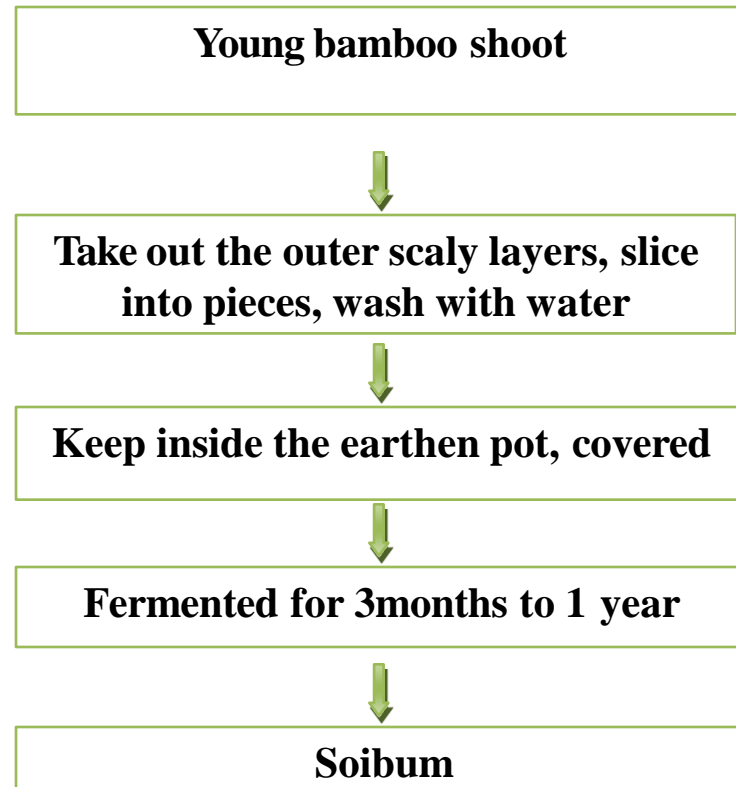


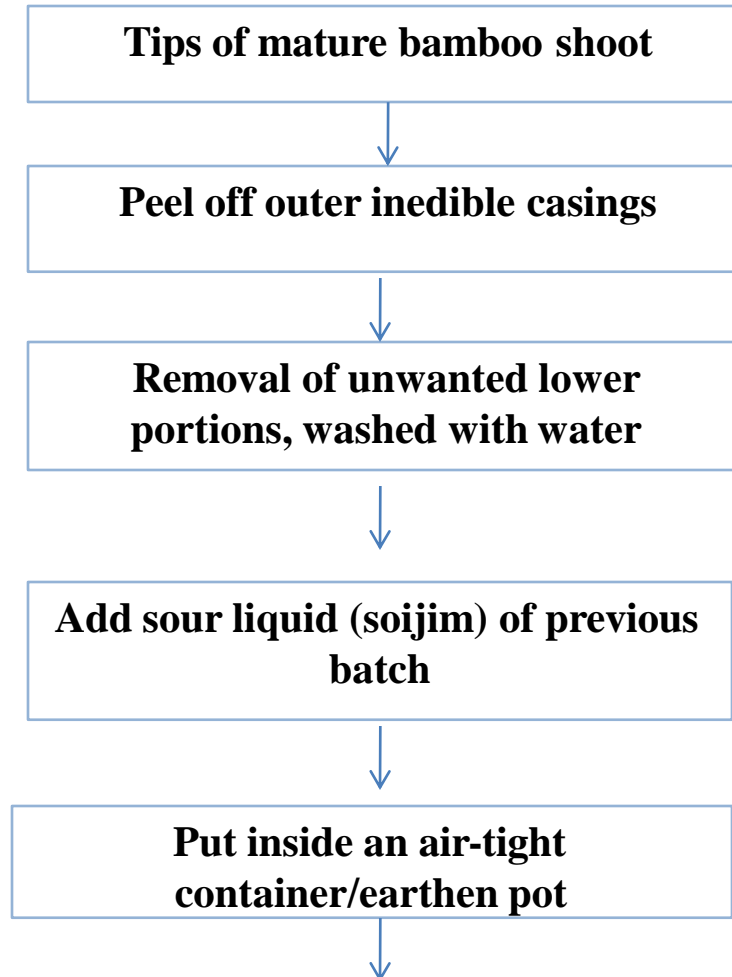
Fig: Soibum preparation in Manipur

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

- Soibum can be prepared from one single species of bamboo shoot or mixed species of bamboo shoot. Generally *D. hamiltonii* and, *B. manipureana* are used for preparation of soibum.
- The androtype soibum has faint aroma and faint taste.
- In this process initially the outer unwanted sheaths of selected bamboo is removed and the soft tender bamboo shoot cut into slices and washed.
- After that the slices of bamboo shoot is put into earthen pot and cover it nicely.
- This is left for fermentation for 3 months to 1 year.

GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

Soidon:



GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

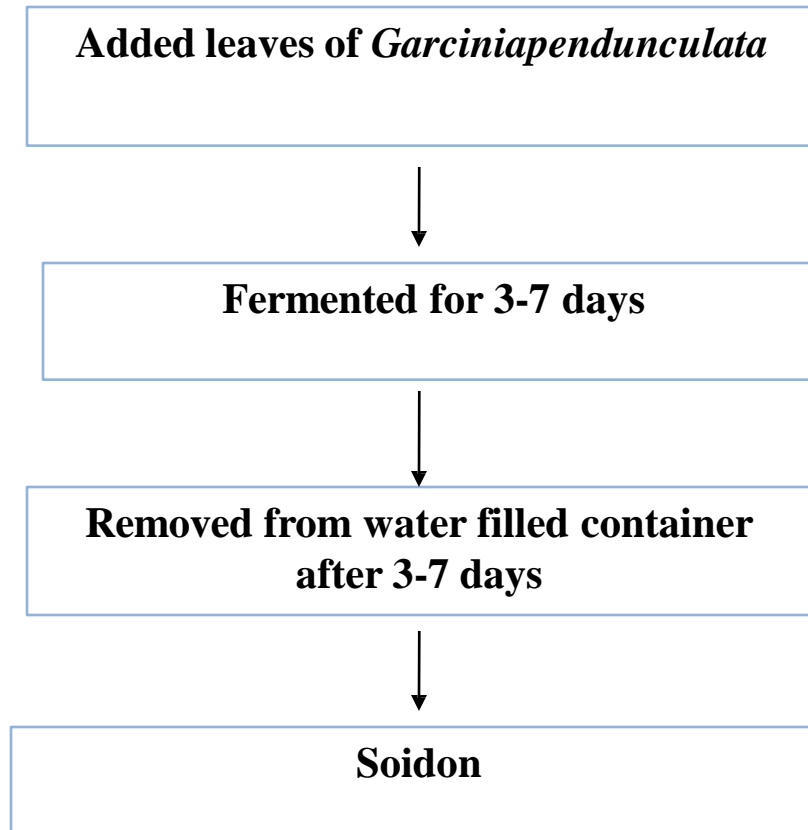


Fig: Soidon preparation in Manipur

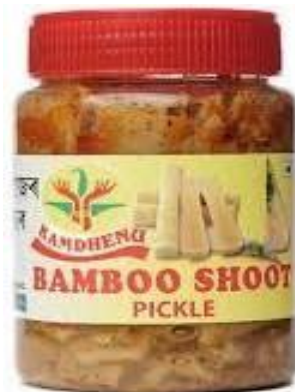
GENERAL PROCESSING METHODS OF BAMBOO SHOOTS

- Soidon is prepared from tip of the matured bamboo shoot.
- The outer layers and lower portions are removed after collecting the tip of mature bamboo shoot.
- After in a container or earthen pot water is taken and the tips which are cut into transversely and longitudinally for 4-5cm are dipped in that water pot, along with the addition of sour liquid (soijim) from previous batch.
- It is now covered and let it ferment for 3-7 days at room temperature. To enhance its flavor additionally leaves of *Garciniapendunculata* can be added in the pot.
- After the fermentation period the soidon is removed from the pot and can keep it in different air tight container for a year at room temperature.

SOME BAMBOO SHOOT PROCESSED PRODUCTS



Bamboo shoot powder incorporated cookies



Bamboo shoot pickle



Dry bamboo shoot



soibum



Fermented bamboo shoot water



Canned bamboo shoot

BY PRODUCTS PROCESSING

- ❖ It was estimated that 70% of the harvested bamboo shoots is being discarded as waste biomass such by products are outer sheath and basal section of the bamboo shoot, and wastewater etc.
- ❖ It was found that like the tender bamboo shoot the byproducts such as outer sheaths and hard basal portion of bamboo shoot also comprise these antioxidant activity and bioactive compounds and also cyanide.
- ❖ So, there is a potential to use these BSPR for extracting bioactive compounds. But there need further research to conduct on innovative ways to eliminate the toxic cyanogenic material without disturbing the nutrients and bioactive compounds present in the BSPR, so that there can be surety of safety of using BSPR extract.

BY PRODUCTS PROCESSING

- ❖ Bamboo shoot outer leafy layers have antimicrobial properties. So, it is used as effective packaging materials for rice balls and meat in Japan.
- ❖ Also, in China it is used traditionally as a container to maintain the taste of tea.
- ❖ The nutritional value of BSPR is higher than common straw, so sometimes it can be used as animal feed.

CONCLUSION

- Bamboo shoot has a great potential for economic growth through cultivation, processing, packaging and commercialization
- There are limited standard processes or technologies for bamboo shoot and mostly the products of bamboo shoot are traditional, local, unorganized and based on the taste of the local people which is following generation wise.
- There is a great scope for development of standard processes or technologies for bamboo shoot based products or preservation of raw bamboo shoots into various food items in an organized manner.



National Institute of Food Technology and Entrepreneurship and Management

Ministry of Food Processing Industries

Plot No. 97, Sector-56, HSIIDC, Industrial Estate, Kundli, Sonipat, Haryana-
131028

🌐 Website: <http://www.niftem.ac.in>

✉ Email: pmfmecell@niftem.ac.in

☎ Call: 0130-2281089