

Banana Pseudo Stem- An Untapped Treasure

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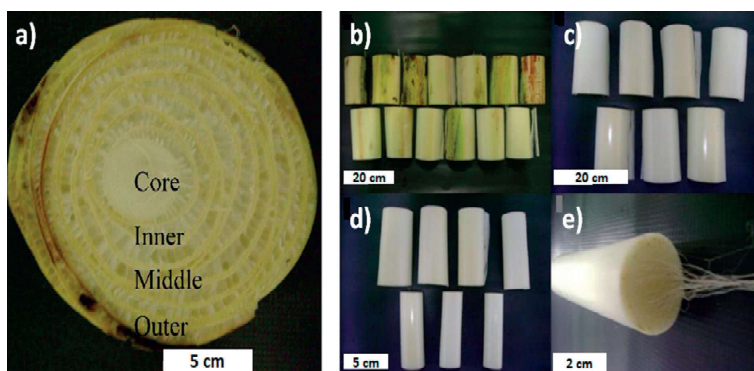
Introduction

Banana is the major fruit crop of the country. It is also known as tree of wisdom/ apple of paradise/ tree of paradise/ Adam's fig/ Kalpataru (plant of virtues) because all most all parts of the plants are useful in one or the other way. Apart from the fruit bunches (economical part), other parts of the plant like male flower, leaves and pseudo stems are mostly discarded as waste after the harvest. Its disposal has become a major problem due to the amount of the biomass produced. It is scientifically proven that the pseudo stem and flowers are rich source of nutrients and minerals than the fruit itself but the awareness about the usage, nutritional and health benefits are not wide spread. In order to the exploit the treasure of nutrients for the use and commercialization of the food products, one must know the other side of the pseudo stem i.e., its structure, nutrient composition and health benefits associated with them and preparation of some tried food products.

Parts of Banana pseudo stem

The banana plant has a shallow rooting system in which the pseudo-stems sprout vertically. As it develops, a single plant may produce about 25 of these pseudo-stems,

which mature at different times. When the plants are 18–24 months old, the outer pseudo-stems are already mature and ready to be harvested. Then, about three or four pseudo-stems are stripped at a period of 6–12 months based on the rate of growth of the pseudo-stem. When the flower is out, the pseudo-stems are completely ready for harvesting. Furthermore, the shaft is cut off below the inflorescence with a knife or sickle attached to a long pole and then the pseudo-stems are cut at their base. Based on the extraction methods, the pseudo-stems can be either stripped/extracted of their fibers in situ or by using a decorticating machine (Subagyo and Chafidz, 2018). The central core which is left after removing the outer fibrous layers is utilized for the food product preparation, it can be either diced as such as vegetable or can be used to extract juice to make refreshing drinks.



(Subagyo and Chafidz, 2018)

Fig 1: (a) Banana pseudo-stem trunk cross section and its parts: (b) Outer parts (c) Middle parts (d) Inner parts and (e) Core parts

Nutritional components of banana pseudo stem

Banana pseudo stem is rich source of the vitamins, minerals and dietary fiber (Ramu *et al.*, 2017).

Proximate analysis	
Moisture (%)	12.30±0.87
Ash (%)	4.93±1.42
Fat (%)	0.98±3.27
Total carbohydrates (%)	46.58±2.33
Starch (%)	21.06±0.87
Energy	64.40±1.25
Protein (%)	7.34±3.60
Total dietary fiber (%)	61.14±0.34
Phenols (mg/100 g)	188.64 ± 0.88
Vitamins (mg/100 g)	
Ascorbic acid	8.81 ± 0.20
Riboflavin	0.08 ± 0.18
Niacin	0.73 ± 0.19
Thiamine	0.15 ± 0.06
Vitamin E	0.12 ± 0.04
Macroelements (mg/g)	
Sodium (Na)	0.02 ± 0.02
Potassium (K)	10.63 ± 0.10
Calcium (Ca)	4.01 ± 0.07
Magnesium (Mg)	1.55 ± 0.18
Phosphorus (P)	2.09 ± 0.04
Microelements (ppm)	
Iron (Fe)	30.65 ± 0.16
Boron (B)	39.88 ± 0.04
Manganese (Mn)	27.86 ± 0.09
Cobalt (Co)	3.79 ± 0.01
Zinc (Zn)	16.60 ± 0.01
Copper (Cu)	0.02 ± 0.01

Health benefits of banana pseudo stem

- Banana stem is a rich source of fibre and helps in weight loss.
- Pseudo-stem has low glycemic index and high antioxidant which is good for diabetes.
- Banana stem is rich in potassium and vitamin B6. Vitamin B6 helps in production of hemoglobin and insulin. It improves the ability of the body to fight infection.
- Potassium helps in the proper functioning of muscles, including the cardiac muscles. It also helps prevent high blood pressure and maintain fluid balance within the body.
- Banana stem is said to be a diuretic and helps detoxify the body.
- It is used to prevent and treat kidney stones.
- It has been reported that a high dietary fibre intake has beneficial effects on human health.
- It also helps to eliminate waste fluids from the body.
- It helps in the treatment for the removal of stones in the kidney, gall bladder and prostate.
- The banana pseudo-stem sap can be orally taken or externally applied for stings and bites.

Pseudo stem based food products

Pseudo stem collected after the harvest of fruit bunches, outer fibrous layers are removed until the hard central core is obtained. Central core which is then utilised for the production of different processed products. Diced central core is used as vegetable, from that culinary dishes like curry, sambar and salad can be prepared. Further it can be processed to pickle, candy, toffees, food bar, canned

central core cubes, dehydrated powder- as dietary fiber supplement. Powder can be used in soup mix, curry, fortification in flours for preparation of roti or chapathis etc.

Like sugar cane, central core of the pseudo stem can be used for the extraction of juice either by using mixer or juice extractor, because of its high phenol content in juice become dark soon after extraction. So it should be treated with lime juice or water or citric acid to minimize the browning or can use immediately. Raw juice has the high amount of phenols which gives strong astringent taste, so it should be consumed after dilution with water. For the additional flavour and acceptability of the juice, one can go for the addition of preferred spices like, cumin, cardamom and pepper, can also add lime, ginger juice, salt or sugar, other juices like mango, orange, aonla, papaya, nannari root extract, mint, lemon grass or preferred fruit or vegetable juice can be added.

Conclusion

Banana pseudo stem is great reservoir of vitamins, minerals, nutrients, polyphenols, fiber etc., possessing several health benefits. Exploitation of these pseudo stem not only solves the disposable problem but also generates wealth (food, health, value added products and additional income) and substantial employment.

Reference

- Ramu, R., Shirahatti, P. S., Anilakumar, K. R., Nayakavadi, S., Zameer, F., Dhananjaya, B. L. and Nagendra Prasad, M. N., 2017. Assessment of nutritional quality and global antioxidant response of banana (*Musa sp.* CV. Nanjangud Rasa Bale) pseudostem and flower. *Phcog. Res*, 9: 74-83.
- Subagyo, A. and Chafidz, A., 2018, Banana pseudo-stem fiber: preparation, characteristics, and applications. *Banana Nutrition - Function and Processing Kinetics*, DOI: <http://dx.doi.org/10.5772/intechopen.82204>.

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