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Bananas as underutilized fruit having huge potential as raw materials for food and non-food processing industries: A brief review

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Abstract
Banana is among the world's leading fruit crops. Banana serves as ideal food among low cost foods and serves nutrients to 4-5 billion population residing in developing country. Banana normally has a short shelf life and start deteriorating just after plucking. The quality of the bananas get further lowered during transhipment to the markets. Over and above over ripening is also a big problem. In order to overcome these problems, the processing of banana must be encouraged. Very small portion of total bananas production undergo industrial processing. Plantain and unripe banana are cooked as vegetable, chips, snacks, powder etc., whereas, mature dessert banana is eaten raw. Characterizing bananas, their processed products and processed consumption forms is necessary to enhance its processing. This will enable niche markets for this major crop, undifferentiated product flows of which are in competition on the world- wide market, to be structured on an objective qualitative basis. This will improve the market efficiency and income to the farmers on one hand and generate employment on the other hand. This review discusses usefulness of banana fruits, peel, leaves, and prospects of using these materials in industry.

Keywords: Ripe banana, unripe banana, processing, peel, leaves

Introduction
Banana is popular fresh fruit all over the world and its name comes from the Arabic word 'banan', which meaning is finger. There are two main varieties of Banana *viz. Musa acuminata* and *Musa balbisiana*. Bananas is rich in carbohydrates and potassium. These are the first choice of athletes owing to its high energy potential (Lehmann *et al.* 2002; Robinson, 1996; Stover and Simmonds, 1987) [33, 43, 47]. The banana fruit is a healthy, nutritious fruit which contains 75% moisture, 23% carbohydrates, 1% protein and 0.5% fat, (Table. 1). The nutritional composition of plantain and banana has been elucidated, starch being the predominant carbohydrate in green fruit. The fruits provide some essential minerals essential for the proper functioning of the human body and contribute substantial amount of vitamin C and carotene (pro-vitamin A), which are among the six vitamins included in the Recommended Daily Allowances of the Food and Nutrition Board of the National Research Council (Ogazi, 1996) [39]. Banana is also rich in B complex (B_1, B_2 and niacin) vitamins (Freitas and Tavares, 2005) [26].

Raw and ripened bananas have a characteristic array of bioactive compounds mainly phenolics, caretonoids, flavonoids and biogenic amines. Some phytosterols were also reported in banana, however there level was low Due to these bioactive compounds, bananas have a higher antioxidant capacity than some berries, herbs and vegetables and this capacity increases during fruit maturity (Singh *et al.* 2015) [45]. Mattila *et al.* (2006) [35] reported that gallic acid, catechin, epicatechin, tannins and anthocyanins are the main phenolic compounds. The total content of phenolic acids in bananas has been reported to be 7 mg/100 g fresh weight. These compounds impart astringent taste to the unripe banana. The main classes of flavonoids detected in bananas are the flavonols, which includes quercetin, myricetin, kaempferol and cyanidin. Many researchers have documented the health benefits of flavonoids present in bananas. Flavonoids are a protective action against oxygen-derived free radicals and reactive oxygen species (ROS) responsible for aging and various diseases. Carotenoids provide health benefits due to their unique physiological functions, such as provitamins and their role as antioxidants, especially in scavenging singlet oxygen. Orange and yellow coloured fruits, such as bananas, are rich sources of carotenoids.

Subagio *et al.* (1996) [48] examined carotenoid content which ranged from 300-400 µg/100 gas lutein equivalents in banana peel by a combination of alumina column chromatography and HPLC. Arora *et al.* (2008) [7] determined the beta-carotene content in selected Indian banana varieties and reported karpooravalli banana cultivar had a high beta-carotene content (143.12 µg/100 g). Banana is a rich source of antioxidant compounds and these compounds reduces risk of neurodegenerative disorders, retards ageing process and helps in lowering the incidence of degenerative diseases, such as heart disease

Table 1: Chemical Composition of banana

Ingredient	Percentage (%)
Moisture contents	75
Sugar	12
Glucose	48
Fructose	40
Maltose	Less than 1
Starch	5
Fibre E 460	3
Amino Acid	3
Fatty Acid	1
Ash	6

Source: International Journal of Tropical Medicine and Public Health (2015)

The dessert banana has a global distribution, considering the nutrition aspect, it is the world's leading fruit crop, and in terms of economic value it is the number five agricultural crop in world trade (Guylene Aurore *et al.* 2009) [8]. It is cultivated in more than hundred countries. The worldwide production of bananas in 2015 was 117.9 metric tonnes (FAOSTAT, 2017) [23]. Bananas are predominantly produced in Asia, Latin America and Africa. India Stands first in banana production which produced 29 metric tonnes per year on average between 2010 and 2015, and China stands second with 11 metric tonnes (FAOSTAT, 2017) [23]. Production in both countries mostly serves the domestic market. Banana is among the world's leading fruit crops even than there are very few processed products from it. More than 85% of global banana production is produced by small-scale farmers, providing an important source of food and income. Among the fruits, banana holds first position in production and productivity in India. Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu and West Bengal are the main banana producing states in India. Total area under Banana during 2010-11, 2011-12 and 2012-13 was 830.50, 796.50 and 776.00 thousand hectares, respectively. During 2012-13, Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra and Gujarat covered more than 58% of the area under Banana (NHB 2014).

Bananas are highly perishable, with a significant proportion of the harvested crop being lost from the farm gate to the market place, owing to poor handling, storage and transportation of the fresh fruits. Additionally, non-harvesting losses may occur in peak production periods due of saturated markets. FAO (1987) [25] an estimate that in total 35% loss of the production of bananas was reported for developing countries. By employing good agriculture practices, novel and effective post-harvest technological tools and optimum storage facilities can reduce losses and increase the income of farmer's producing banana. Currently, there is very limited commercial processing of bananas. Most people consume bananas fresh, steamed or boiled. During bumper harvests, farmers sell bananas at very low prices and many go to waste. But Bananas represent a potential raw materials for food and non-food processing industries (Aurore *et al.* 2009) [8], and it can easily processed to several value added products like banana puree, dried banana blossoms, banana flour, banana Chips, banana wine, banana vinegar, banana figs, banana sauce, sauce and paste from banana peeling, vinegar from banana peeling, and banana cats upon your farm (Emaga, *et al.* 2007) [17]. The banana chips and flour can be stored for up to four months, and can be sold or used to make various value added products to further increase your income. Banana chips and flour are easily transported to distant markets, where bananas are not grown. They can also be sold in local markets and to hotels and supermarkets. The banana flour can be mixed with other cereals and legumes flours to make tasty and healthy porridge, bakery products and baby foods. Banana flour can also be used as a relief food during droughts, floods and other emergencies. Apart from this other banana products, which may be made from the non-edible parts, include compost, animal feed and a wide range of craft items made from banana fibre, such as hats, bags, purses, cloths and blankets. So, the banana is important for health, food security and increase income of farmers (Mohapatra *et al.* 2010) [36].

In spite of its leading role its importance in the diet of certain tropical populations and all its benefits banana, does not undergo industrialized processing comparable to that of other fruits and vegetables grown outside tropical zones, such as the tomato, orange, apple and potato. In this review, potential of banana as a raw materials for food and non-food processing industries are examined as well as a brief discussion is presented. There may be huge market for develop processed products tailored to modern consumer expectations, providing a greater variety and convenience of uses, by making products which can be used in other products' formulation.

Processing and Uses

Bananas are a staple food in many parts of Eastern Africa. Bananas are a good source of potassium, which helps keep your body fluids in balance. Banana is a ideal food for toddlers invalids and people living with HIV/ AIDS (Aurore *et al.* 2009) [8].

Banana is consumed after removal of peel and it is a good source of vitamin B_6, potassium and fibre. Ripen banana fruit is mainly consumed as raw, whereas unripen fruit is utilised as cooked vegetable, chips etc. The fruit can also be processed for a number of food products. Ripe banana fruits can be pulped for puree making which further used in a variety of products including ice cream, yogurt, cake, bread, nectar, and baby food. Ripe fruit can be dried and eaten, or sliced, canned with syrup, and used in bakery products, fruit salads, and toppings. (Aurore *et al.* 2009) [8], Green bananas can be sliced and fried as chips. Whole green fruits can also be dried and ground into flour. Vinegar and alcoholic beverages can be made from fermented ripe bananas. Other parts of the banana plant are consumed besides the fruit. The banana leaves are not eaten but may be used for wrapping food in cooking (Mohapatra *et al.* 2010) [36].

The banana foliage and pseudo stems are used as cattle feed during dry periods in some banana producing areas. Culled bananas are used to feed cattle and hogs. Bananas are a good energy source but need to be supplemented with protein (Emaga, *et al.* 2008, Dormond, *et al.* 1998a, 1998b) [18, 15, 16].

Banana Flour or Powder

Drying is the best processing method for a perishable food product. There is huge demand of fruit powders in the baking and confectionery industry. The demand for banana flour in bakery products is increasing worldwide and banana flour is currently being exploited in baking and complementary weaning foods (Baiyeri, 2004; Adeniji and Empere, 2001) [9, 4]. Flour has a longer shelf life than the raw fruits because of reduced water activity. Converting fresh banana fruits to flour also adds value to them. Banana flour is prepared from green unripe fruit cooking banana or plantain and is therefore characterised by high starch content (Crowther, 1979; Thompson, 1995) [12, 49]. Due to high nutritional value banana flour has a great potential for commercialization. Banana powder used as a substitute for fresh banana in making traditional cakes or their premixes as well as in the processing of banana snacks, crackers or crisps due to presence of sugar and starch.

For consumption or processing of banana fruits are hand peeled which often proved difficult and takes time to achieve. Crowther (1979) [12] reported that fruits may be soaked in hot water before peeling, but this method rarely helps, and with experience, hand-peeling untreated fruit can be quite successful. The stage of maturity and the nutritional qualities are important factors in the production of banana flour and its uses in various food preparations. It has been observed that stage of banana ripeness affects the quality of chips and the physical properties of cooked banana flours (Onyejegbu and Ayodele, 1995; Lemaire *et al.* 1997) [39, 33]. Factor affecting the production of a good quality banana powder are bananas variety and degree of ripeness. Mostly immature and over ripe fruits are screen out from bulk.

Sweet bananas have higher water content (75%) than cooking bananas and plantain (66%) according to Dadzie (1998) [14]. The high moisture content of banana which affects dry matter content must be taken into account when deciding which types or varieties of bananas are best suited for making flour or beverage. Therefore, based on moisture and dry matter content, most cooking bananas can be better for making flour while most sweet bananas are better for making juice. Some of the improved hybrids produced by the international institute of tropical agriculture have differentials in water contents that may rank them in either classes for flour, juices, and liquors.

Types of banana flour

Banana flour further divided into ripe banana flour and unripe (green) banana flour depends upon the raw material used for production of flour. The advantages of green banana flour include the content of high total starch (73.4%), resistant starch (17.5%) and dietary fibre content (14.5%) (Juarez-Garcia *et al.* 2006) [29]. Green banana flour might be an important source of polyphenol, compounds that are regarded as natural antioxidants (Vergara *et al.* 2007) [51]. In addition, it can be used in place of traditional thickeners such as wheat, soy, and cassava starch and corn starch, improving the nutritional value and assuming the taste of the foods.

The high sweetness of ripe banana flour makes it a suitable ingredient for traditional sweet dishes, syrups, ice-creams, deserts and also for new product development (Abbas *et al.* 2009) [43].

Unripe banana flour has exhibited a nutritional/nutraceutical potential (Da Mota, *et al.* 2000; Englyst *et al.* 1992, Perez and Schnell, 2004) [13, 20, 28] and represents an alternative source of indigestible carbohydrates and antioxidants compounds. Several studies have suggested that consumption of unripe bananas provides a beneficial effect on human health, associated with indigestible components such as resistant starch (Faisant. *et al.* 1995) [22]. Recently, several researchers added unripe banana starch and flour for preparation of different foods such as pasta (Ovando-Martinez. *et al.* 2009 [39], Saifullah. *et al.* 2009) [42], bread (Juarez-Garcia, E. *et al.* 2006) [29], and slowly digestible cookies (Aparicio-Saguilan *et al.* 2007) [6], and edible films. The feasibility of partially replacing wheat flour with plantain flour in bread and biscuit making were investigated by Mepba *et al.* (2007) [34], and utilization of green banana flour as a functional ingredient in yellow noodle was a another study carried out by Saifullah, *et al.* (2009) [42]. Despite all currently there is no real industrial banana flour or starch based production, even for animal feed.

Banana chips

Fried bananas chips are produced by deep-frying green unripe or partially ripe pulp slices. Wash the fruit, peel neatly and slice using a plantain slicer (kitchen wonder) into disc or longitudinal shapes. The fruit may be salted before or after slicing and then deep-fry in vegetable oil until crisp. To prevent sticking of pulp slices, the peeled fruit can be salted whole and then slice directly into the heated oil.

The chips should be removed as soon as crisp and golden yellow colour (in case of plantain chips) is attained. Drain the chips and leave to cool at room temperature. Select the chips to remove broken ones and then pack in a polyethylene bag and seal with electric sealer. The shelf life of plantain chips is greatly reduced when exposed to air and light. The typical golden yellow colour of plantain chips fades away gradually, and turns white. Greater improvements have been made on plantain chips production in Nigeria (Adeniji and Tenkouano, 2007, Adeniji and Tenkouano, 2007, Ogazi, 1996) [2, 2, 39]. The use of electric fryer and improved packaging materials is being encouraged to meet both domestic and export markets

Banana Puree

Mature bananas are generally used for production of viscous food products as during ripening starch is converted into simple sugars and soften the fruit and point of maturity affects the final product quality. The color index of bananas are checked and bananas having 6 to 7 are selected for puree preparation. Bananas are washed thoroughly to remove adhering dirt and any chemical residue that may be present. Bananas are either boiling water or steam blanched until a centre temperature of 93 °C is reached and generally it takes 10 to 15 min. Blanched bananas are then cooled and peeled. The blanched bananas are mashed and blended by using blender machines to obtain puree. The puree minimally placed in air to obtain banana puree with an attractive color, fine texture and retains its fruity flavour. Banana puree must be further treated with preservatives, antioxidants, stabilisers and emulsifiers to ensure their preservation until the moment of final utilization and processing. The puree can be stored in frozen condition, tetra packed, aseptic packaging or canning. The puree is used for infant foods, as beverage, snack foods, jam, jellies, confectionary products and sauces.

Banana Jam

Ripen banana having sweet taste, fine flavour and texture is suitable for production of excellent jam (Aurore *et al.* 2009) [8]. It can be easily processed jam as other fruits. In one

method for the preparation of jelly, fully ripe or over-ripe fruits are used. Fruits are hand-peeled and cut into 2 cm pieces or slices. The banana slices are boiled for 1 h in 60° Brix sugar syrup at the rate of 1 lb of banana slice to 1 pint of syrup (454.01 g to 0.5681). This is then strained and the clear solution is boiled until it sets. The Ph should be adjusted to 3.5. Pectin may be added to improve the set. A commercial formula for producing banana jam is as follows: 200.02 lbs of sugar, 10 gallons of water and 12.2 ounces of cream of tartar. These are heated to 110°C and then 2.5 gallons of lemon juice (lime juice or citric acid can be used to replace the lemon juice to reduce the pH of the jam to 3.5) are added. The mixture is heated to 107 °C until the correct consistency is obtained.

Banana Sauce

Banana sauce is a ready-to-eat to sauce. It is used for moistening, flavour control and as a garnish to make food more delicious. The sauce has a strong banana taste and flavour and a dull yellow-red colour. The total soluble solid content varies from 39-40°Brix depending on the variety of bananas. It has a shelf-life of one year when stored in bottles.

Banana Drink

Banana puree is used extensively in the processing of straight banana drink (Aurore *et al.* 2009) [8]. This banana drink needs no dilution before consumption (Adeniji *et al.* 2010) [5]. The product is pasteurized at 90 °C to destroy microorganisms, molds and yeasts before bottling. Banana drink can also be canned or aseptically packed. The drink has the TSS content of 12-13°Brix and pH of 4.0. The drink may or may not be sweetened. The sweetening agent used can either be sucrose or a combination of sucrose and HFGS. In the enzymatic treated banana drink, pectinase and amylase are added after the acidification process to produce a clear drink. Preservatives like sodium benzoate, sodium nitrite, nitrates, sulphur dioxide, carbon dioxide, copper carbonate and benzoic acid may be needed to extend the shelf life of fresh juice. Banana juice may be packaged in different types of materials such as protective paper packages, bottles, spectra packages, and plastics. All these packaging materials are effective in keeping dust, microorganisms and contaminated air away from the fruit juices. Canning of juice involves the use of agitate, spiral or helical retorts. Filling is done at high speed with a weighed amount done mechanically or using automatic filling machines. The cans are exposed to steam or hot water to create space at the top. Filled and exhausted cans are sealed automatically. Hermetic sealing ensures that no air enters. Oxidation is one of the most important free radical producing processes in food, chemicals and even in living systems. Free radicals play an important role in food and chemical material degradation, contributing also to more than one hundred disorders in humans (Ye and Song, 2008; Trible, 1999) [51, 49].

Canned Banana Desserts

The banana fruit (yellow peel with brown flecks) were used for producing canned banana desserts. The bananas were peeled, the ends of fruit being cut off, after which they were cut into slices about 8-9 mm thick. At this stage the yield of edible part in relation to whole fruit weight was determined. Blanching was carried out in a kettle of stainless steel, a metal basket with banana slices being placed in the kettle. The ratios of the banana mass to that of the bath were 1:5. For samples the blanching time was so determined as to reduce the enzymatic activity of the raw material by at least 80% and to induce the shrinkage of slices, this showing the removal of gaseous substances. These conditions were met in the procedure of blanching at 80-82 °C for 120 s. In the discussed experiment the cooling stage was omitted, the cans being filled with warm slices. During the 24-hour soaking of banana slices, with gentle stirring at intervals of a few hours, in the concentrated solution of sucrose various additives were used while the ratio of fruit weight to that of the syrup was 6.4:5. After blanching or soaking the losses in weight of the raw material were determined.

The prepared banana slices were preserved in cans, 0.32 dm^3 in volume. The stock of bananas was 200 g, the solution constituting 40% of the preserve, *i.e.* 133 g. In all the samples investigated a solution of the following composition was used: 35.0% sucrose, 0.8% citric acid, 0.2% L-ascorbic acid, and water to 100%. Since the slices of fruit, especially after blanching, were delicate and easily stuck together, about 50% of the solution was poured first into the cans. The fruits were then packed and the remaining part of the solution added. This procedure permitted the removal of air from the preserve. The temperature of the solution was about 80 °C. The pasteurization conditions were experimentally determined, the selection of parameters being tested in a thermostat. The following procedure of conservation was used increasing the temperature to the pasteurization level – 10 min, the pasteurization at 80-82 °C - 12 min, the cooling of canned products to 35 °C - 8 min. After complete cooling and drying, the cans were placed in an air-conditioned chamber at about 10 °C, where they remained to the time of evaluation. (Jaworska. *et al.* 2004) [27].

By-product Utilization of banana

Banana Peel: Banana waste materials are rich source of nutrients and minerals. Banana peel is rich source of starch (3%), crude protein (6-9%), crude fat (3.8-11%), total dietary fibre (43.2-49.7%), poly unsaturated fatty acids, essential amino acids and micronutrients. So peels could be good material for cattle and poultry feed. Banana peel can further utilise in various products such as peel powder and can also be used for wine production.

Banana Peel Flour: The amount of fruit waste from the peels is expected to increase with the development of processing industries that utilize the green and ripe banana. The banana peel accounts about 40% of the total weight of fresh banana (Tchobanoglous. 1993) [47]. The banana peel is rich in antioxidant compounds (Someya *et al.* 2002) [44] which implying the potential value of the peel in terms of antioxidant content, Perhaps in the future it may be possible for technologist to mix and match the pulp and peel flour in order to achieve techno functional properties without sacrificing the aesthetic values of their products. This development can spur the utilization of banana peel as innovative ingredients in various foods (Emaga, *et al.* 2007) [17]. The use of banana peel flour in production of cereal bars is feasible and, even with different sensory profiles, cereal bars with banana peel flour are acceptable, which may favour the development of new products for different market niches.

Banana Plant Leaves: Leaves are used extensively for weaving baskets, mats, food wrapper for marketing and cooking, coverings over food, tablecloths, and plates for

eating as well as cup of drinking soup (Mohapatra *et al.* 2010) [36]. In India and Asia, banana leaves are used like aluminium foil. They are used to wrap food prior to steaming and grilling. The leaf makes an excellent platter and food served on these leaves tastes delicious. The leaves are not eaten but while steaming food some of the polyphenols are imparted to the food.

Banana Flower: The banana flower grows at the end of a bunch of bananas. It is a leafy maroon colored cone with cream coloured florets layered inside. These florets need to be cleaned well before they are cooked as a vegetable. The banana flower is rich source of various vitamins, flavonoids and proteins. The banana flower has been used in traditional medicine to treat bronchitis, constipation and ulcer problems. It eases menstrual cramps. The extracts of banana flower have antioxidant properties that prevent free radicals and control cell and tissue damage. (Kumar and Bhowmik, 2012) [29].

Healing and Medicinal Properties of Bananas: Banana is a ready to eat and a most affordable fruit for human consumption, which works to build good health, due to its immense nutritional and medicinal value. Health benefits of banana pulp are mainly due to phenolic acids and flavanoids (Borges *et al.* 2014) [10]. Eating bananas provides high quantity of potassium to the body, which is beneficial for the muscles. Owing to its high iron content, banana is mainly recommended for anaemic patients and was also proven to be beneficial in controlling blood pressure as it has low salt and high potassium content. Serotonin in banana helps to overcome or prevent depression by changing mood and relaxing the body. Banana fruit contains resistant starch which has lower digestibility, therefore slow release of glucose in blood. Resistant starch present in banana is suitable for the diet of heart patients and diabetic people, owing to its hypocholesterolemic action and positive effects in the human intestine. Plantains are very good food for sugar patients as these have low carbohydrate content and higher nutritive value when compared with potatoes (Lassoudiere, 2007). [30] Banana peel has proven to be beneficial in the treatment of diabetes, due to their antihyperglycemic effect in many animal trials. Consumption of carotenoid rich banana overcomes vitamin A deficiency. Dopamine, ascorbic acid and other antioxidants present in banana reduce the plasma oxidative stress and enhance the resistance to oxidative modification of low density lipoproteins. Norepinephrine and dopamine present in banana elevates blood pressure and serotonin inhibits gastric secretion by stimulating the smooth muscle of the intestines (Kumar *et al.* 2012) [29]. The high content of iron in bananas increases the production of haemoglobin in the blood therefore they are very good for anaemia patients (Kumar *et al.* 2012) [29].

- They regulate bowel movement, whether it is constipation or diarrhoea. Our elders believed that eating a banana after every meal improved digestion significantly.
- When person suffer from a hangover, a banana milkshake with honey can give you immense relief.
- Cold milk soothes the stomach lining and bananas with honey build up depleted blood sugar levels.
- Bananas are also good for students as the rich source of potassium can make a person very alert; the fruit is often called a brain tonic.
- Bananas work well as a snack for people who have high blood pressure as they are wholesome with low salt levels.
- For those suffering from depression, bananas are good as they contain a protein called serotonin, which is also called the 'happy hormone' as it makes one feel happy and relaxed.
- Bananas can be eaten regularly to treat ulcers as they neutralize acidity in the stomach. This soft and smooth fruit cannot irritate the stomach walls.
- For pregnant women suffering from morning sickness, eating bananas in between meals helps immensely in settling the queasiness in the stomach.
- Eating bananas helps people give up smoking as this fruit is rich in vitamin C, A, B6 and B12. Bananas contain potassium and magnesium as well, which help the body recover from nicotine withdrawal.
- Bananas have an antacid effect also so people who experience heartburn find relief on eating a banana. Potassium is a major mineral which normalizes heartbeat while regulating the body's water balance. As banana is a rich source of potassium, it helps in re-balances disturbances of fluids in the body.
- For weight watchers, banana is an excellent snack in place of crisps and chocolates. Research found that food craving during high pressure work could be assuaged safely and in a healthy manner by eating a banana every 2-3 hourly as it is a high carbohydrate food that controls blood sugar levels (Kumar and Bhowmik, 2012) [29].
- Topically, the peels of a banana with yellow side on top can be taped to warts. It will shrivel and fall off.
- The peel of a banana fruit can be rubbed on a mosquito bite with good effect, the stinging sensation stops and the swelling also reduces.
- A ripe banana mashed and applied on the face is great at moisturizing and nourishing tired and dry skin. .

Conclusion

The review of literature presented above suggests that banana is of great nutritional value. It has a rare combination of energy value, tissue-building elements, protein, vitamins and minerals. Banana is a good source of calories since it is rich in solids and low in water content as compared to any other fresh fruit. Bananas are a good source of vitamin C which helps to rebuild the immune system. The products of banana production, which are consumed globally, make this crop an object of common interest. Whole banana plant is useful in food, feed, pharmaceutical, packaging, and many other industrial applications. In India, many of social and religious ceremonies require banana tree, apart from leaves and fruit. Fruit of this plant is not only rich source of carbohydrate, antioxidants, but also a good source of mineral especially potassium and iron, an ideal weaning mother and infants. Banana peel is rich in vitamins, pectin, sugar and lignin and can be used as a cattle feed, base material for alcohol production, biogas production and for pectin extraction. Fibre obtained from banana pseudostem and sheath can be utilised as biodegradable binding ropes. Banana leaves are a good lignocellulosic source and have varieties of uses from feed to wrapping materials for specialised food product and even thatching material in banana growing places. The objective of this review paper is that to promote the processing of bananas by post-harvest technological tools, so we can reduce losses and increase the income of farmer's producing banana as well as profitable farming in our country.

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