Indigenous Knowledge and Uses of Bananas for Health

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ABSTRACT

Bananas are huge herbaceous blooming plants of the genus Musa that produce an elongated, edible fruit. Banana as a fruit has been a significant part of diet in numerous parts of the world, where also its leaves are utilized in various purposes. Banana tree grows in tropical and subtropical conditions in various regions of India, aside from those bearing harsh winters, especially in northern parts of the country, such as, Himachal Pradesh, Jammu and Kashmir etc. The Indian state that produces the most bananas is Maharashtra. The banana has tremendous nutritional value. It offers significant number of calories, vitamins, and minerals. People in southern India frequently consume it as a staple food source, due in part for its easy availability. The scent of bananas is well-known, but they are also highly abundant in potassium, calcium, and sodium-free nutrients. Bananas are the ideal food to provide important nutrients since they contain three types of regular sugars: sucrose, fructose, and glucose, as well as fiber, which contributes to boosting of energy levels. It is ideal for consumption by both children and adults, as a source of calorie although limited in proteins and fats. Children might eat it as puree. Because they are a rich source of vitamins C, D, and E, and traces of minerals such as K, Mg, Zn and Fe, bananas are referred to as the ‘health fruit’. It also contains beta-carotene, making it ideal for middle-aged women to help maintain vitality. The growth of bananas using tissue culture techniques has also increased banana production. Although there are numerous efforts to extend the shelf life of bananas. They may be processed into a variety of by-products that have great commercial value. Such as, baby food, chips, juices, shakes, powder, rolls and cakes.

Keywords—banana, biproducts, nutrition, health

# INTRODUCTION

Banana (Musa paradisiaca L.) is a large herbaceous, monocotyledonous, and monocarpic plant. Banana belongs to family Musaceae of order Scitamineae. Banana, also known as, "Apple of Paradise", has its significance in Indian sub-continent from the ancient times of Ramayana (Approx. 2020 BC) and Kautilya’s Artha Shastra (300-400 BC). Strong evidence of its legendary importance may also be regarded in the sculptures and paintings of Ajanta and Ellora (600 BC). The eatable banana is believed to have originated from M. acuminata and M. balbisiana in the hot, tropical regions of South East Asia, as depicted in figure 1.



Figure 1: *Musa Acuminata* which contains high value of sugars and *Musa balbisiana* which contains high value of starch also have seeds.

M. paradisica and M. balbisiana are of Indian origin. The plant and its by products are utilized in various festivities, whether it be in a social capacity or offerings to deities, as part of the Indian social tradition. Banana is one of the well-known natural products accessible to the society. In addition, plantains are considered miracle berry that is majorly consumed around the world, providing a more flexible diet than any other fruit or vegetable. The green banana which becomes edible after cooking, and is a staple nourishment in beach front district of India particularly in the territory of Kerala. It is rich in easily digestible sugars with a calorific estimation of 67-137 K Cal/100 g of fruit. It is a significant source of vitamin A, C, B and B2. They are also a rich source of minerals such as magnesium, sodium, potassium, phosphorus, calcium, and Iron. Around 24 bananas each weighing around 100 g, could give the daily nutritional requirements of 2400 calories for an adult [1].

Banana is the most significant fruit crop in India and records for 36.6 percent of the world banana production. India is also the largest consumer of Bananas. In India, Tamil Nadu, Maharashtra, Kerala, Gujarat and Karnataka are the main banana producing states. Due to favorable agroclimatic conditions and an abundance of wells and waterways, it is primarily grown in the Surat, Vadodara, Bharuch, Navsari, Valsad, Anand, and Kheda districts. The most well-known cultivar in Gujarat and Maharashtra is Grande Naine (AAA), whereas Pooven (AAB), Nendran (AAB), and Marthaman (AAB) are the primary cultivars in Tamil Nadu, Kerala, and West Bengal, respectively as listed in Table 1. Comparing India's banana production efficiency to that of other affluent countries, it is low (17.80 tons/hectare). The absence of valuable planting material, the prevalence of lethal diseases including bunchy top, bacterial infection, leaf spot, and invasion of nematodes and other bugs are the main reasons for lower cultivation yields. Major part of the produce is consumed within the nation, with a small percentage being exported (<1%).

|  |  |
| --- | --- |
| State | Cultivars |
| Andhra Pradesh | Dwarf Cavendish (AAA), Robusta (AAA), Amritpani (Rasthali AAB), Thella Chakkrakeli (AAA), Karpoora Chakkrakeli (Poovan AAB) |
| Assam | Jahaji (AAA), Dwarf Cavendish, Bor-Jahaji (AAA, Robusta), Malbhog (AAB), Chinia (AAB), Manohar (ABB), Kanchkol (AAB), Chini Champa (AB), Bhimkol (AAB) |
| Bihar | Dwarf Cavendish, Alpan (AAB), Chini Champa, Malbhog, Muthia (ABB), Kothia(ABB), Monthan (ABB) |
| Gujarat | Dwarf Cavendish, Lacatan (AAA), Harichal (Lokhandi, AAA) |
| Karnataka | Dwarf Cavendish , Robusta, Poovan, Rasabale (AAB, Rasthali), Hill Banana (AAB), Monthan, Elakki Bale (AB) |
| Kerala | Nendran (AAB), Palayakodan (Rasthali), Dwarf Cavendish, Robusta, Monthan, Red Banana (AAA) |
| Maharashtra | Basrai (Dwarf Cavendish), Robusta, Lal Velchi (AAB), Safed Velchi (AB), Rajeli (AAB, Nendran) |
| Tamil Nadu | Red banana, Poovan, Rasthali, Nendran, Monthan |
| West Bengal and Odisha | Champa (AAB), Morthman (AAB, Rasthali), Amrit Sagar (AAB), Giant Grover (AAA), Lacatan, Monthan |

Table 1: Various varieties which are grown in different states of India

Suckers are the conventional method of banana plant propagation. The in vitro tissue culture process in bananas has accelerated the creation of disease-free uniform plantlets with simpler transportation and better crop output because compared to the traditional way, as suckers per plant is modest (5-8 plants/year). Rapid assessment and improvement of advanced genotypes of Banana can improve planting efficiency all year round. Consequently, improving in vitro techniques for spreading banana plants is viewed as basic for long haul endeavors planned for improving banana culture around the world [2-8].

Progressively methodical research is necessary for the preservation and representation of hereditary diverse varieties, the enhancement of cultivars resistant to biotic and abiotic stressors, and technology adoption for profitability with high quality soil assessment is required. The Indian states that produce bananas are the subject of shared issues. The unpredictability of challenges necessitates fundamental, essential, and flexible research to maximize output and profitability in banana production using an interdisciplinary and comprehensive technique without altering the surrounding environment. There has been a more than 10X increment of banana production during the recent 25 years while the last decade has seen a steep development, because of innovative approach to banana cultivation. The region has expanded from 0.20 million hectares in mid-70's to 0.802 million hectares in 2014's, while cultivation has recorded a giant hike from 3 million tons to 29.7 million tons. Many fruits like apple, grape etc. are comparatively less in yield as compared to banana which is shown in figure 2.

Figure 2: Production of Apple, Banana and grape per million tons annually in India (NHB 2016).

The receipt of better insights on advancements and improvement efforts in banana and plantain is what has led to this significant increase in the production and profitability of banana. This was made possible by the availability of high yielding genetic material, particularly for the Cavendish collection of bananas, an improved creation framework, and the adoption of efficient insurance innovations for the control of serious annoyances and illnesses under various climatic conditions, all of which have contributed to the rapid development of the banana industry in the country.

In addition to its nutritional advantages, bananas are popular on a global scale due to its economic importance, particularly to small-scale ranchers in underdeveloped countries. Bananas and plantains are the fourth most significant staple yield on the planet and are basic for food security in numerous tropical nations. Various varieties are developed in more than 130 nations over the world in a region of 5 million hectares creating 103.63 million tons of banana and plantain [9]. Due to climatic factors, most of the world's banana production occurs in Africa, Asia, the Caribbean, and Latin America. Worldwide, the cultivation of bananas and plantains continues to show tremendous growth. It is a key crop for all strata with enormous potential due to its year-round accessibility, affordability, flavor, nutritive and therapeutic value. A large variety of Musa cultivars with varying genomic and agro - climatic characteristics may be found in India, which has facilitated the development and feeding of a vast array population, while considering local needs. India is the largest producer of bananas in Asia and the globe, producing 25.57 percent of global production from a region where production is 15.5%, followed by China (9.8) and the Philippines (8.9) [10]. Banana production rate as described by FAO is given below in figure 3.

Figure 3: Banana production rate annually is given of India, China and Malaysia.

**Mechanical innovations in plant tissue culture**

The technique is based mostly on the notion that plant cells are totipotent, which alludes to a single cell's ability to share its entire genome during cell division [11]. The ability of cells to alter their incorporation, development, and improvement is equally important to and vital for recovering the entire plant, in addition to the totipotent capacity of plant cells [12]. All the nutrients needed for a plant's regular growth and development are present in plant tissue culture medium. It is mostly composed of macronutrients and micronutrients, electrolytes, natural components, plant growth regulators, carbon sources, and sometimes gelling agents in the event of a strong medium [13]. The most often used medium for the in vitro vegetative proliferation of numerous plant species is Murashige and Skoog medium (MS medium). The media's pH has a substantial impact on both plant growth and the movement of plant growth regulators. It is adjusted between 5.4 and 5.8 in accordance with the inducement procedure. The structure of the medium, particularly the plant hormone and nitrogen source, has an impact on how the underlying ex-plant reacts. Plant growth regulators (PGRs) are responsible for determining how plant cells and tissues develop in culture medium. The most often used plant growth regulators are auxins, cytokinins, and gibberellins. The type and grouping of hormones used are primarily determined by the type of plant, the targeted tissue or organ, and the purpose of the experiment [14]. Although the high assembly of cytokinins promotes shoot regeneration, the high convergence of auxins often supports root development. A mass of undifferentiated cells known as a callus, advances when auxin and cytokinin levels are equal. Most of the time, meristematic tissue growth provides a method for removing debris from infections and other common pathogen diseases. Micro-propagation is a tissue culture (in vitro) technique that is widely used to produce high-quality planting material in species with vegetative spread. It is used for quick and consistent type augmentation of plants on artificial supplement media under controlled conditions. The most notable benefits of micro-propagation include the ability to quickly produce large numbers of infection-free propagules from a single plant, year-round engendering, the ability to fit proliferating material in a small area, a reduction in work costs for germplasm support, the avoidance of field tests and environmental risks, easy access to material for miniature scale proliferation, and rapid growth [15].

**Technological Protocols**

With a view toward its practical commercial reasons, fast advancements in plant cell culture and micropropagation have been made in the recent past. the method begins with the selection of plant tissues (ex-plant) from a disease-free solid, fiery mother plant with the ultimate goal of micro-propagating planting materials [16]. Any part of the plant, including the leaf, apical meristem, bud, and root, may be used as ex-plant material [17].

Stage 0: Preparation of contributor plant, to promote the chance of progress, the mother plant ought to be ex vitro developed under ideal conditions to limit smearing in the in vitro culture [18].

Stage I: Initiation stage- In this stage an ex-plant is surface sanitized and moved into supplement medium. Consolidated use of bactericide and fungicide items is proposed. The determination of items relies upon the sort of ex-plant to be presented. The surface sanitization of ex-plant in synthetic arrangements is a significant advance to expel contaminants with negligible harm to plant cells [19]. The most ordinarily utilized disinfectants are sodium hypochlorite [20], calcium hypochlorite [21], ethanol [22] and mercuric chloride [23]. The way of life is brooded in development chamber either under light or dim conditions as per the technique for spread.

Stage II: Multiplication stage-This stage is to build the quantity of propagules under which the number of propagules is duplicated by rehashed subcultures until the ideal number of plants is accomplished [24].

Stage III: Rooting stage-The establishing stage may happen all the while in a similar culture media utilize for duplication of the explants. In any case, at times it is important to change media, including nourishing adjustment and development controller synthesis to incite establishing and the improvement of solid root development.

Stage IV: Acclimatization stage-At this stage, the in vitro plants are weaned and solidified. Solidifying is done bit by bit from high to low dampness what is more, from low light force to high light power. The plants are then moved to a fitting substrate (sand, peat, manure and so on.) and step by step solidified under nursery.

**Somatic Embryogenesis**

It is an in vitro technique for plant recovery broadly utilized as a significant biotechnological instrument for continued clonal producing [25]. It is a procedure by which substantial cells or tissues form into separated embryos. These embryos can form into entirety plants without experiencing the procedure of sexual treatment as done by zygotic incipient organisms. Substantial embryogenesis can proceed directly from explants or alternatively indirectly by the callus, which is a clump of undifferentiated cells [26]. By enlisting embryogenic societies from zygotic seeds, leaves, or stems segment and further duplicating developing organisms, plants can recover through physical embryogenesis. Numerous plants, including trees and elaborate plants from different families, have been found to exhibit significant embryogenesis. The acceptance and development of significant incipient organisms in developed cells is influenced by a variety of factors. Physical embryogenesis on grapevines has been accounted for by a highly effective convention that showed improved plant recovery when the tissues were refined in fluid medium [27]. Plant growth regulators play a crucial role in the survival and reproduction of physically developing organisms. Rose half and half on medium boosted with various PGRs (plant growth regulators) alone or in combination produced the highest level of underdeveloped callus proficiency [28]. When the embryo was developed on ABA alone, the underdeveloped callus showed a high germination rate. Physical embryogenesis is seen as a significant tool for genetic control as well as a method of recovering the plants for mass engendering. The process can also be used to produce plants that are resistant to various pressures and to display the attributes through hereditary change, according to Bouquet A. and Terregrosa L. [29]. By using this tool to recover cotton cultivars with protection from Fusarium and Verticillium shrivels, a successful convention has been established [30].

**Organogenesis**

The process of establishing plant organs such as roots, branches, and leaves that may emerge directly from the meristem or indirectly from the callus. Organogenesis is a method of plant recovery that involves the formation of calluses and the division of atypical meristems into organs by altering the centralization of plant growth hormones in supplement medium. Skoog and Miller (1957) were the first to demonstrate that a high auxin to cytokinin ratio sped up root recovery while a high auxin to cytokinin ratio energized the arrangement of shoots in tobacco callus.

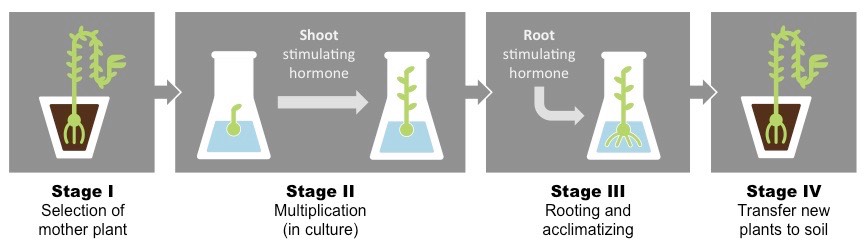


Figure 4: Showing the 4 stages of micro-propagation

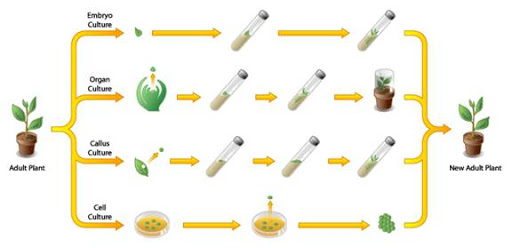


Figure 5: Showing the different processes of germination in Plant tissue culture

**Nutritive Constituents**

A banana has dietary fiber, potassium, and vitamin C. Bananas include vitamin C, which helps the body defend itself and heal from illnesses. This vitamin is crucial for the development of blood, the fusion of connective tissues, and the absorption of iron. Additionally, bananas include all the B vitamins, including folic acid, riboflavin, thiamine, and riboflavin. On the mineral scale, zinc and iron are measured after calcium and magnesium. More nutrient-dense and easily absorbed than many other natural items, bananas are. Banana organic product processing takes 105 minutes less time than apple (210 min). In addition to being rich in potassium, calcium, and sodium content, bananas are also well recognized for their scent, surface, and ease of peeling and eating, most of the fruit is consumed locally. In parts of East Asia, where annual utilization of bananas as a staple food, bananas attain their greatest notable significance [31]. The banana has exceptional health benefits. It offers a respectable number of calories, vitamins, and minerals. South Indians typically eat bananas as a nutritious diet. In comparison to certain other natural goods, bananas are more nourishing and readily absorbed. Bananas are popular for their surface and aroma in addition to being high in potassium and calcium and low in salt [32]. Because of its composition and dietary supplement content, in vitro tests and clinical examinations demonstrate that bananas are effective as a food medicine for treating a variety of illnesses, including hypertension, ulcers, loose stools, and Alzheimer's disease [33].

Bananas and plantains hold significant agricultural and nutritional importance worldwide. They rank as the fourth most important crop after rice, wheat, and maize. These fruits are considered vital sources of energy and staple food, especially in tropical humid regions. From a nutritional standpoint, bananas and plantains are rich in various nutrients such as carbohydrates, sugars, vitamins (including vitamin C), and minerals (like potassium, calcium, sodium, and magnesium). However, they are relatively low in protein content. Despite this, they still offer essential vitamins and minerals that contribute to a balanced diet. Recent studies on bananas grown in Africa and South America have found a link between the yellow-to-orange hue of the flesh and higher carotenoid content. Carotenoids are pigments with antioxidant properties and have potential health benefits. Some banana cultivars have been identified to be particularly rich in carotenoids. While there has been a growing interest in the nutritional benefits of Musa species (bananas and plantains), there is limited published data on the variability in micronutrient concentrations within different cultivars. However, the consumption of iron and zinc-rich banana cultivars could potentially help address micronutrient deficiencies in developing countries. Overall, bananas and plantains play a crucial role in providing sustenance and essential nutrients to populations in tropical regions, and ongoing research in this area aims to further explore their nutritional benefits and potential impact on addressing nutritional deficiencies.

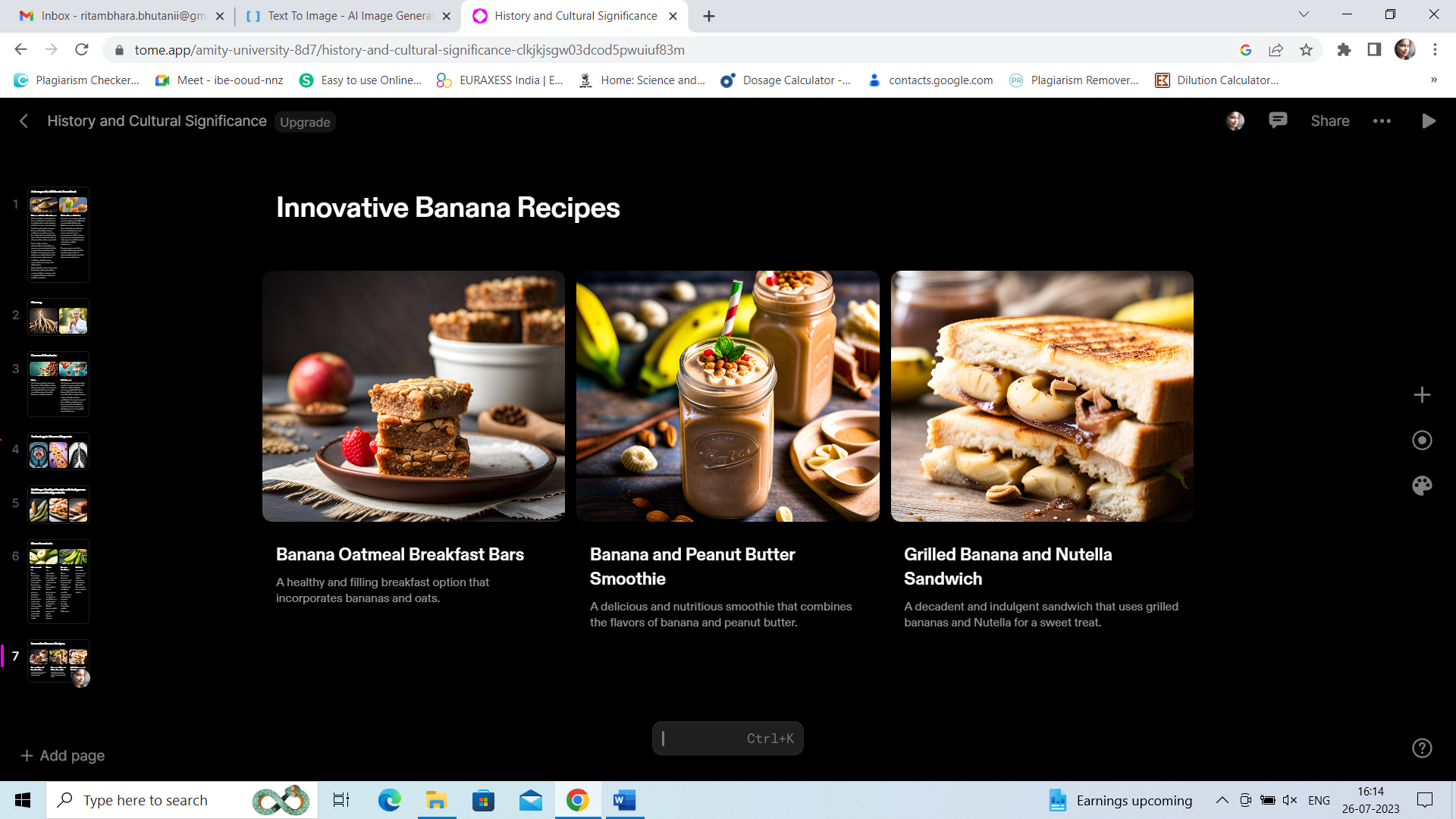


Figure 6: Showing different banana recipes

A key indicator of human prosperity is food security. Even though there are more than 20,000 different varieties of edible plants, only 20 species provide 90% of our food worldwide [34-35]. Numerous poorly known indigenous species that can be found in the wild are not being recognised, despite the crucial role they play in ensuring the food security of local and intergenerational networks. The Musaceae family includes bananas, which are widely cultivated in tropical regions of Asia, Africa, and Australia [36]. It is a small family made up of only two genera, Musa and Ensete, and has about 50 species [37]. Asia is the main region of origin for the Musa type, particularly the southern and southeastern regions [38]. The class has a staggering number of important plants, especially those that produce tasty fruit like bananas and plantains. While the unripe products of plantains are frequently used as vegetables, the developed products of bananas are used as dessert [39]. The recognised eatable bananas, which are triploids, typically occur in half and half amongst the several M. acuminata subspecies and interspecifically between M. acuminata and M. balbisiana, with very few exceptions [40]. As a result, wild bananas play a crucial role in the development of its cultivars [41]. Even though there are many potential Musa Linn. varieties/cultivars that have been created for vegetables and fruits, it is still unclear how healthy some wild species, such M. acuminata and M. balbisiana, are. There are nine species of Ensete Horan, a distinct variant of the Musaceae family, of which just one, E. superbum, is found in the Western Ghats. The species is indigenous to the region, underused, and found in scattered populations at high altitudes. The blossoms of several Musa cultivars are used as vegetables in India, particularly to prepare cutlets and "thoran," a vegetable side dish with coconut. The indigenous varieties of Musa and its related tax on Ensete superbum, which are least exploited for their edible value, have not yet been thoroughly studied. Ensete, which is sometimes referred to as a "tree against hunger" and is a harvest for food security in several African countries [42], is a class that receives the least attention and is ineffectively considered. E. superbum, an Indian species, has received less study to date.

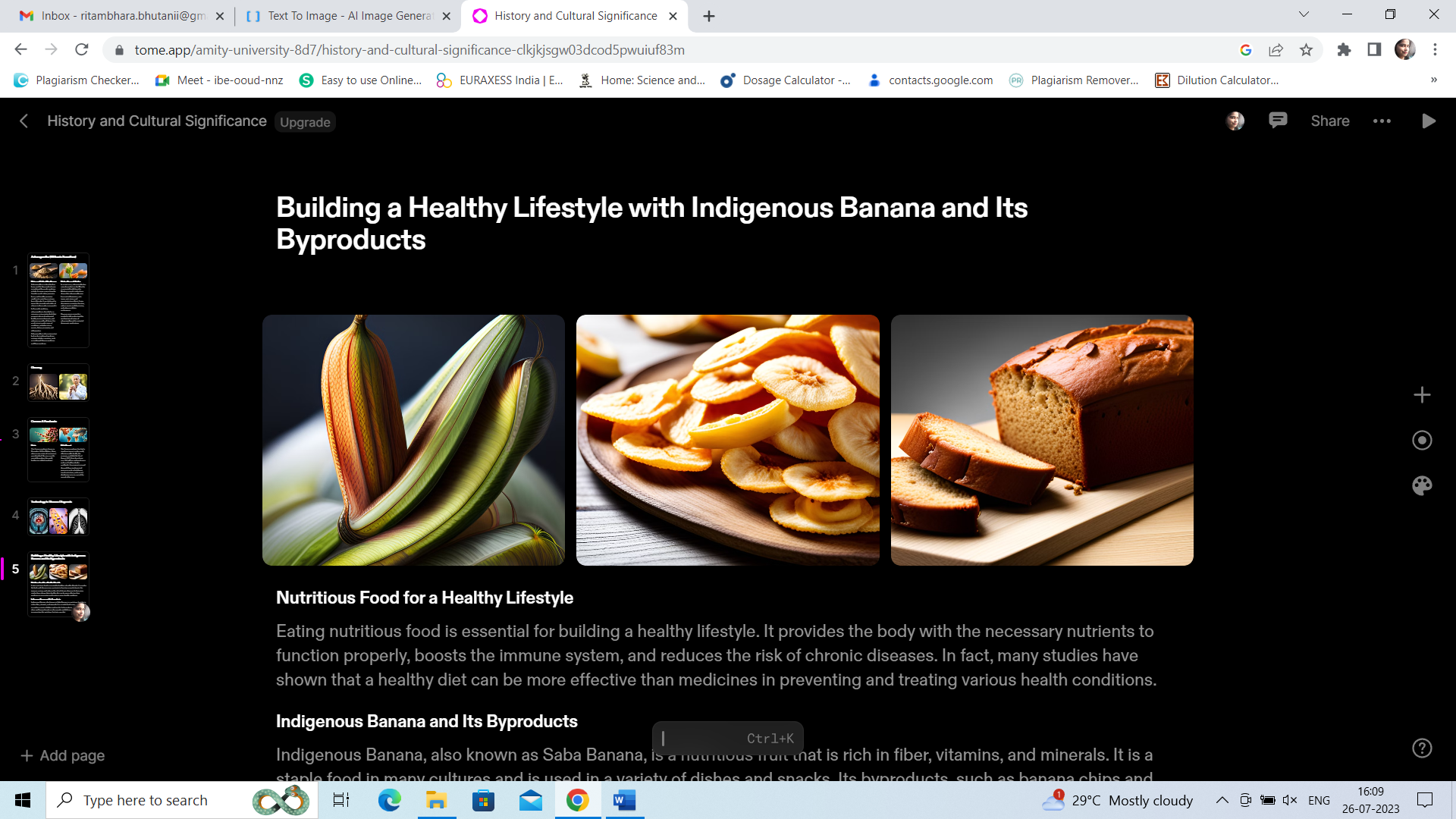


Figure 7: Indigenous Banana, also known as Saba Banana, is a nutritious fruit that is rich in fiber, vitamins, and minerals. It is a staple food in many cultures and is used in a variety of dishes and snacks. Its byproducts, such as banana chips and banana bread

Since the beginning of human civilization plants have made enormous commitments to encourage human wellbeing and prosperity [43]. The phase of development of plants significantly influences the convergences of supplements in plants [44-45], hence it is essential to pick reasonable phase of harvesting [46]. Therapeutic possibilities of most regular plants have been broadly contemplated and aggregated however the absence of data with respect to the capability of these plants at different phases of improvement makes these plants to be exceptionally underutilized. During the procedure of development and improvement of fruit, arrangements of formative changes are experienced. These procedures include facilitated changes in various catabolic and anabolic responses [47], which prompt the blend or debasement of wide scope of bioactive mixes. Thus, fruits at different development levels may have striking bioactive mixes, which should be concentrated in order to give development files to its use as a wellspring of food or medication. It has additionally been demonstrated that ethno-organically determined mixes have potential bioactive mixes and they in this way give more noteworthy potential to item improvement [48]. The phase of development at which any fruit is collected likewise impacts the fruit's green-life or its capacity to be put away for significant stretches [49]. Fruits collected at a beginning time of development are of low quality after maturing, despite having a long stockpiling life [50]. Additionally, reaping at a propelled phase of development is inadmissible for fruits proposed for significant distance shipment because of their shorter stockpiling life. Anyway, as indicated by [51] the suitable chance to reap unripe plantain for greatest advantage is between the twelfth and fourteenth week. This fourteen-day term gives sufficient opportunity to collect, circulation, showcasing and use of the produce before maturing. Expanded vegetable usage and utilization are basic to reduce overall frequency of wholesome lacks. Examinations have indicated that a few plants add to expanded admission of some basic supplements and wellbeing advancing phytochemicals. Phytochemicals are available in for all intents and purposes the entirety of the fruits, vegetables, vegetables (beans and peas), and grains we eat, so it is very simple for a great many people to remember them for their eating routine. Musa paradisiaca L is an herbaceous plant; the inflorescence is large with a rosy earthy colored bract and is eaten as vegetables. Musa sapientum known as evident banana or treat banana is typically eaten crude at development. It has a place with the AAA genomic gathering. Musa saba L is fundamentally a cooking banana although it can likewise be eaten crude. It is one of the most significant banana assortments in Philippine food. It is otherwise called the Cardaba banana or just Saba banana. Saba bananas are a piece of the saba subgroup (ABB). Saba banana is a triploid (ABB) half and half of the seeded banana Musa balbisiana and Musa acuminata [52]. It has dominating Musa balbisiana quality. It's likewise assigned as Musa acuminata × balbisiana Colla (ABB Group) 'Saba' [53]. Minerals are normally happening substances that are strong and inorganic which are spoken to by a synthetic equation, generally abiogenic, and has an arranged nuclear structure [54]. Like nutrients, minerals are additionally important to keep up legitimate body capacities.

**Banana By-products**

They are common straightforward, fixed in their own wrapper giving a flexible fruit to a treat, cooking or for mixing into dietary milk shakes. Banana is a tropical fruit developing in more than 122 nations around the world. Until 2004, the developed region of 3.8 million hectares and a complete production of 56.4 million metric tons of the fruit were created positioning it fourth behind rice, corn, and milk [55-56]. As of late, Banana strip has been used for different mechanical applications including bio-fuel creation, bio-sorbents, mash and paper, beautifying agents, vitality related exercises, natural manure, ecological cleanup, and biotechnology related procedures [57-59]. Its mass development and utilization in the late decades made it the world second biggest fruit crop with an expected gross creation surpasses 139 million tons [60]. The local individuals have been using these plants more than just for food purposes yet have started to investigate the conceivable outcomes of using banana plants in their day-by-day life. Banana manor involves enormous piece of the land; however, it is a pollution source because after collect, the tree is cut down and deserted in the fields, which instigates Sigatoka [61].

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Nutrients | Banana chips | Banana flour | Banana baby food | Banana health drink | Banana soup | Banana biscuits | Banana pasta | Banana bread  (g/100g) | Banana juice |
| Image | bananachips.png | bananaflour.jpg | Banana-Baby-Food1-500x467.jpg | banana-smoothie-700-519.jpg | bananasoup.jpg | bananabiscuits.jpg | bananapasta.jpg | sk-ultimate-banana-bread.jpg | set-of-banana-juice-and-two-fresh-bananas-isolated-vector-15604121.jpg |
| Energy(Kcal/100g) | 434.4 | 248 | 184 | 257.3 | 60 | 277 | 290 |  | 59.48 |
| Carbohydrate (%) | 46.7 | 60 | 40 | 60 | 11 |  | 71.4 | 35.2 | 14.6 |
| Protein (%) | 0.38 | 1.25 | 4.2 | 2.6 | 3.5 | 0.89 | 83 | 3.81 | 0.17 |
| Acidity (%) | 0.18 | 0.48 | 0.46 | 0.31 | 0.68 |  | 1.80 | 0.21% | 0.30 |
| Oil Content (%) | 27.4 |  |  |  |  |  |  |  |  |
| Fat (%) |  | 0.34 | 0.8 | 0.78 | 0.07 | 1.26 | 0.23 | 2.74 |  |
| Starch (%) |  | 74.50 |  |  |  |  | 73.2 | 15.6 |  |
| Sugar (%) |  | 0.56 | 20.7 | 28.3 |  | 13.5 | 2.6 | 5.60 | 12.93 |
| Phosphorus (%) |  | 0.10 |  | 0.15 |  |  |  |  |  |
| Potassium (%) |  | 1.1 |  | 0.85 |  |  |  |  |  |
| Calcium (%) |  | 1.21 |  | 1.60 |  |  |  |  | 0.065 |
| Magnesium (%) |  | 1.21 |  | 0.49 |  |  |  |  | 0.009 |
| Sodium (%) |  | 0.3 |  | 0.30 |  |  |  |  |  |
| Iron (ppm) |  | 3.3 |  | 286 |  |  |  |  |  |
| Copper (ppm) |  | 5 |  | 135 |  |  |  |  |  |
| Manganese (ppm) |  | 26 |  | 97 |  |  |  |  |  |
| Zinc (ppm) |  | 4.2 |  | 54 |  |  |  |  |  |
| Vitamin C (mg/100g) |  |  | 6.6 | 9.4 |  |  |  |  | 7.14 |
| Moisture (%) |  |  |  |  |  | 3.73 | 5 |  |  |
| Total CHO (%) |  |  |  |  |  | 66 |  |  |  |
| Fiber (%) |  |  |  |  |  | 9.2 |  |  |  |
| Carotene (mg/100g) |  |  |  |  |  | 300 |  |  |  |

Table 2: Contains the nutrient content of different banana products.

It is known as the 'regular man's fruit'. It is exceptionally nutritive and delicious. India positions first among the banana developing nations of the world with a yearly creation portion of 25 % of the aggregate gather. During the previous two decades the huge scope development of this fruit crop has experienced impressive changes. Banana is maybe one of the significant harvests, which has acknowledged tissue culture as a method of engendering particularly in India. Shorter gather times and upgraded yields have promoted the development of this fruit crop as for the territory of development and creation by tissue culture techniques. Banana when aged is a delicate and sensitive fruit with a post-gather time span of usability of 5-10 days [62]. This makes it inclined to injury during transport. Further, arrival of ethylene during mass stockpiling causes the fruit to mature quicker and the fruits for the most part decay before arriving at its goal. Consequently, it has continually being viewed as an 'issue fruit' as for transportation. These reasons add to a neighborhood showcase excess, resultant value crash and ensuing lack of engagement among the cultivating network to develop it on an enormous scope. It is subsequently critical to survive this issue by creating an expanded interest of this fruit crop. Investigating prospects of changing over banana into a money crop by creating results of business intrigue is one method of taking care of this issue. Trial Fruit juices are the most widely recognized and requesting items made from a large portion of the devastating and/or pounding of fruits. Nevertheless, in instance of banana this procedure brings about a clingy, uneven mass with no juice. For banana juice creation, any assortment of banana like Basrai, Harichal or Cavendish can be utilized for extraction. A procedure has been created to extricate just about 60 – 70 % of the all-out solvent materials of banana as juice. This procedure has been licensed [63]. Taste board considers were led at Food Technology Division, FIPLY, BARC including 30 specialists [64]. Items assessed included banana juice [65], ready banana powder [66] and items produced using ready banana powder, and for example, banana bread rolls, banana cake [67] what's more, banana infant food [68]. The dry powder can be utilized as an added substance in sweet shops, milkshakes, and child nourishments. Different items created from ready banana powder in research facility incorporate rolls, cake, and infant food. Scale-up of this innovation gives an astounding extension for the improvement of nonconventional items from banana. The extricated squeeze after a weakening is prepared to serve as nectar and/or after carbonation as a beverage. Banana squeeze likewise can be utilized for the creation of banana wine by maturation, which has a great deal of business esteem.

**Conclusion:**

This chapter focuses on the nutritional value of native bananas and their regeneration using a technology called plant tissue culture. Because it contains abundant amounts of Vitamins C, D, and E, bananas are known as the fruit of prosperity. Additionally, it contains -carotene. It is important to mention a few minerals found in Bananas including K, Mg, Zn, and Fe. India is thought to be one of the main origins of M. paradisica, while M. balbisiana also has Indian origins. This plant has significant value in, be it societal or religious, it is a part of Indian tradition. Bananas are typically disseminated using suckers. Although the number of suckers produced per plant is relatively low (5-8 plants per year), which is meager. In vitro tissue culture techniques in bananas offer a faster rate of growth, clean, disease-free, uniform plantlets, easier transportation, improved harvest yield, quick assurance and expansion of top-notch genotypes, and year-round availability of planting materials. In India, plantains and bananas have been widely cultivated in both tropical and subtropical regions, including Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Orissa, Bihar, Eastern Uttar Pradesh, West Bengal, Assam, and north-eastern states. These regions also have economic and social significance. Micro-propagation proliferation is a tissue culture (in vitro) technique used for quick and dependable plant growth on artificially enhanced media under regulated conditions. It is widely utilized for the generation of valuable planting material in species with vegetative spread. Even if there are several efforts underway to extend the usability of bananas, their handling has already advanced significantly because they may be used to produce a variety of goods with high commercial worth simply because of their dietary content and nutritional value. The byproducts of bananas include banana chips, banana juice, banana shakes, banana powder, banana rolls, and banana cakes. Bananas can also be used to make baby food, which has the same amount of energy as bananas.

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