



A Review On Musa Plant

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ABSTRACT –

Bananas (*Musa* spp.) are giant perennial monocotyledonous herbs of the order Zingiberales, a sister group to the well-studied Poales, which include cereals. This group includes both dessert and cooking types of bananas. Bananas are the most widely consumed fruit in developed nations and are essential for food security in many tropical and subtropical regions. In Southeast Asia, the domestication of *Musa* began some 7,000 years ago. It involved the selection of diploid and triploid seedless, parthenocarpic hybrids that were subsequently widely dispersed through vegetative propagation. These hybridizations between diverse species and subspecies were encouraged by human migrations. Nowadays, soma clones originating from a single triploid genotype (Cavendish) account for half of the production. Diseases and pests have steadily evolved, posing a serious threat to the world's banana crop.

One of the most widely grown fruits in the world, bananas (*Musaceae*) is also among the oldest plants used for medicinal purposes, with a wide range of uses. Clarifying the effectiveness of this plant's naturally occurring active ingredients—particularly the antimicrobials—has garnered attention lately. This review starts with a synopsis of the banana plant's history, its various cultivars, and a synopsis of its components. The antimicrobial properties of various experimental tests and the relevant bioactive compounds of the banana part extracts are then elaborated. Various recent and developing uses of banana pieces as a natural antioxidant, fiber/prebiotic source, fat/sucrose substitute, and wheat substitute in the creation of functional dairy, meat, and bakery products are also covered.

One of the healthiest fruits is the banana because it is high in minerals, fatty acids, proteins, and carbs. Traditional medicine has used bananas to treat burns, ulcers, diarrhea, and coughs and colds. Numerous bioactive substances found in bananas, including tannins, alkaloids, phenols, flavonoids, and saponins, have been linked to a number of health benefits, including anti-inflammatory, anti-cancer, antioxidant, and anti-microbial properties. The current review is centered on providing a thorough overview of the nutritional, biological, and phytochemical characteristics of various banana species and their various parts. Chemical profiling of the banana's seed, pseudostem, and leaves is lacking and needs more research, despite extensive characterization of the compounds found in many parts of the plant having been completed.

KEY WORDS – Musa Plant, Banana, Antimicrobial, Wound Healing, Antidiarrheal

I. INTRODUCTION -

The genus *Musa*, which holds great importance in human society, yields the fourth most important food in the world today, following rice, wheat, and maize, along with bananas and plantains. Many *Musa* species are used by humans for a variety of purposes, from cold-hardy fiber to beautiful plants to the tropical fruits and plantains that are edible. *Musa* species are found growing in a wide range of environments. Since the beginning of written history, they have been an essential part of the human diet. [1] large perennial herbs growing to a height of 2 to 9 meters (6.6 to 30 feet), these plants originated in Southeast Asia, New Guinea, and the Indian

subcontinent. In the present day, they have developed secondary loci of genetic variety in Africa, Latin America, and the Pacific.[2]

The musa species has grown to be extremely important in Pacific societies. It can be used for a wide range of ritual and religious purposes as well as for food, drinks, fermentable sugars, medications, flavorings, cooked foods, silage, fragrance, rope, cordage, garlands, shelter, clothing, and smoking material. Banana and plantain are best suited for plantation-style production in full sun, interplanting in diverse systems, and traditional Pacific island agroforestry, with the exception of atoll islands. Despite being mostly consumed locally in the Pacific, the fruit has a sizable global export market.[3]

Although Musa is not regarded as an invasive species, it is a tenacious plant that may compete rather effectively with other species in controlled agroforestry settings. Because several cultivars are particularly prone to specific pests and diseases, monocrops and even backyard banana plantings can be difficult to manage and require a lot of labor to keep in good, productive form.[4]



Image 1

II. TAXONOMY ^[5] –

KINGDOM: Plantae

DIVISION: Magnoliophyta /Spermatophyta

CLASS: Liliopsida/Monocotyledoneae

ORDER: Zingiberales

FAMILY: Musaceae

GENUS: Musa

SPECIES: Musa acuminata

III. MORPHOLOGY –

Bananas are perennial herbs that resemble trees. Its lack of woody tissues and the fact that the fruit-bearing stem withers away at the end of the growth season make it a herb. Because suckers—shoots that emerge from lateral buds on the rhizome—take over and grow into fruit-bearing stems, it is a perennial.[6]

What appears to be a trunk is actually a pseudo stem, a compact collection of overlapping and spirally organized leaf sheaths, not a wooden stem. The underlying rhizome, the aerial stem to which the leaves are attached, and the peduncle, to which the inflorescence is attached, comprise the "true" stem.1. Beginning on the apical meristem of the rhizome, the stem develops inside the pseudostem and finishes in the male bud.[7] Bananas do not actually grow on trees, despite the widespread belief that they do. Banana trees are the largest herb in the world, despite the fact that they can reach heights of up to 20 feet. The fruit is actually a gigantic berry, and the large modified stem that is commonly mistaken for the tree's trunk is actually only the fruit itself.[8]

Since bananas are perennial plants, they will continue to grow and bloom for many years. A banana plant's life cycle is separated into two distinct phases: the vegetative phase, during which the plant gets ready to reproduce, and the reproductive phase, during which the plant starts to bear fruit.[9]



Image No – 2 (Morphology of Musa Plant) [29]

IV. CHEMICAL CONSTITUENTS –

The growing parts of the plant contain tannic and gallic acid. Ripe fruits contain 22% sugar; Starch, albuminoids 4.8%, fats up to 1% and non-nitrogenous extracts 6 to 13%. It contains large amounts of vitamin C and some vitamin B [6]. Leukocianidin is a flavonoid isolated from unripe bananas [9]. Minerals found in the fruit includes magnesium, iron, potassium, zinc, copper, phosphorus, aluminium, sodium, nitrogen and manganese. It has been found that fruits are very rich in micro and macro elements. It has been found that phosphorus and manganese are more concentrated in ripe fruits, while unripe fruits contain large amounts of calcium and selenium.[10] Aspartic acid, glutamic acid and leucine are the main amino acids found in ripe fruits. Fruit contains acylsteryl glycoside, sitoindoside IV. The ash from the peel of ripe fruits contains potassium carbonates and soda, alkaline potassium phosphate chlorides and calcium silica. Green plantain contains a large amount of tannins. The juice of the plantain flower stems is composed of potash, soda, lime, magnesium oxide, aluminium oxide, chlorides, sulphur dioxide, phosphorus anhydride, silica and carbon dioxide.[11]

V. TRADITIONAL USES –

The plant *Musa acuminata* has traditionally been used to treat infectious and non-infectious diseases, particularly in Asia and Africa. It is often used as important wild foods and medicinal plants by tribal communities (Chintamunnee and Mahomoodally, 2012; Ghorbani et al., 2012; Subbaraya, 2006). All parts of the plant including fruit, stem, pseudo stem, Flowers, leaves, sap, inner stem, inner core and root have been used in the

treatment of many people.[10,12] Diseases related to blood pressure control, diabetes, hypertension, anaemia, allergies, infections, bronchitis and other respiratory diseases, treats fever, cough, tuberculosis and dysentery among various tribes and ethnic groups around the world. Root extract is used to prevent conception, to induce labor during labor, and to treat genital tract infections communicable diseases such as HIV/AIDS infections, internal and external injuries Genitalia, vaginitis and vaginal discharge. Other traditional uses described in the literature include: Anthelmintic, used as a dressing for wounds and blisters on the skin and as a tonic for relief for joint pain and to improve blood circulation.[13]

VI. THERAPEUTIC ACTIVITIES –

1. Antihypertensive effect:

The effect of bananas on deoxy corticosterone acetate (DOCA)-induced increase in mean arterial pressure was studied in albino rats. Consumption of the plantain diet by DOCA-pretreated rats reduced mean blood pressure to control values. Furthermore, there was no significant change in mean arterial pressure in rats treated with DOCA following a pre-plantain diet compared to the control group.[14] Chronic consumption of plantain can reduce DOCA-induced elevated mean arterial pressure and also prevent the occurrence of DOCA-induced hypertension in rats.[15]

2. Antimicrobial activity:

In a study evaluating the in vitro antimicrobial activity of plantain root extracts, benzene extract was found to have significant bactericidal and fungicidal effects. The hexane extract showed significant activity against gram-negative bacteria. In one study, banana showed activity against *E. coli* and *Staphylococcus aureus*. [2] In another study, methanolic extract of fruit peel of *Musa paradisiaca* showed significant activity of against *Bacillus subtilis*, *Staphylococcus aureus*, *E.coli*, *Pseudomonas aeruginosaina* compared to benzyl penicillin and streptomycin. It also had an inhibitory effect on *Candida albicans* and *Cryptococcus neoformans*. [19]

3. Wound healing attribute –

Banana peel has been reported to have a healing effect due to its dominant influence on mucosal defense factor, which increases DNA synthesis and promotes mucosal cell proliferation. The healing effects of methanol and aqueous extracts of ribwort plantain (*M. sapientum* var. *paradisiaca*) were tested on rats. [18] Both extracts were found to increase levels of hydroxyproline, hexuronic acid, hexosamine, superoxide dismutase and increase wound tensile strength. The extracts also reduced the surface area of wounds and scars as well as lipid peroxidation. These effects are attributed to the antioxidant properties of plantains. [25]

4. Antidiarrheal effect –

A clinical study was conducted to evaluate the effectiveness of a solution containing 50 g/l plantain flour and 3.5 g/l sodium chloride for rinsing children with acute diarrheal diseases. 121 children received WHO ORS and 117 received plantain flour solution. A plantain flour solution has been shown to be effective in treating dehydration due to acute diarrheal illnesses [7]. A double-blind clinical trial conducted on a group of people aimed to evaluate the therapeutic effect of green bananas on pectin in children with persistent diarrhea, 62 boys aged 5 years. - 12 months were randomly assigned to receive a rice-based diet containing 250 g/liter cooked green banana or 4 g/kg pectin or a rice-only diet for 7 days. Green banana and pectin significantly reduce the amount of stool, the need for oral rehydration solutions/intravenous fluids, the number of vomits, and the duration of diarrhea. Green banana and pectin are useful in the dietary treatment of persistent diarrhea in hospitalized children and may also be useful in treating children at home. [16]



HEALTH BENEFITS BANANA PLANT

- Rich in fiber
- Cures Anemia
- Aids in digestion
- Boost immune system
- Flushes out kidney stone

Image 3 (Health Benefits of Banana Plant) ^[30]

5. effect on the atherosclerosis -

Plaque buildup inside the arteries is the hallmark of the disease known as atherosclerosis. Ambon (*Musa paradisiaca*) peel was employed in a study to determine its efficacy as an anti-atherosclerotic agent by using an immune histochemical method to increase e-NOS (endothelial nitric oxide synthase) expression and inhibit NF-KB (nuclear factor kappa beta) in atherogenic rats.[17] It was found that the extract, in a dose-dependent manner, increases e-NOS activity and significantly reduces NF-k β activity. The extract can raise e-NOS expression by roughly 95.2% and decrease NF-k β activity by 82.19%, according to linear regression analysis. Consequently, it has been demonstrated that the Ambon banana peel extract effectively prevents atherosclerosis.[18]

6. ability to lower blood cholesterol –

The presence of saponin, tannin, and flavonoids in kepok banana peels contributes to their antioxidant properties, which lower blood total cholesterol levels. The purpose of this study is to ascertain whether the flavonoids, tannin, and saponin found in kepok banana peels can lower the total blood cholesterol levels of obese mice. Twenty fat male mice, *Mus musculus* L. strain Deutschland-Denken-Yoken, were used in this experiment.[19] The mice were split into four groups: a normal control group, an obese control group, and groups that received treatment with an extract of Kepok Banana Peel *Musa acuminata* at doses of 8,4 mg and 16,8 mg per day. In 14 days, the treatment was administered. Using a spectrophotometer, each group's total cholesterol level was determined.[20]

7. Antioxidative Property –

Although banana fruits (*Musa acuminata* Juss.) are an important food, the phenolics associated with their cell walls have not received much research. The soluble extract of the fruit pulp in this study contained condensed tannins, + catechin, gallic acid, and – epicatechin; anthocyanin's and soluble anthocyanin's were absent.[7] Two hydroxycinnamic acid derivatives dominated the soluble cell wall fraction, while the

anthocyanidin delphinidin—which is the first anthocyanidin found in banana cell walls—dominated the insoluble cell wall fraction.[15,16] The total phenolic content released following the hydrolysis of the water-insoluble polymer was correlated with the remarkable antioxidant capacity demonstrated by cell wall fractions, particularly after acid and enzymatic hydrolysis, but not for the water-soluble polymer that was hydrolysed afterward.[21]

8. anti-ulcer properties -

Natural remedies derived from plants are still the preferred treatment option because they are considered safe, effective, and have few negative side effects. The Natural Products Discovery Laboratory at University Selangor, Malaysia's Institute of Bio-IT Selangor conducted research on *Musa acuminata*'s cytotoxic, antioxidant, hepato protective, and antiulcer genic properties.[22] The findings indicated that, in certain scenarios, the methanolic extracts of unripe *Musa acuminata* exhibited activity comparable to that of the commercial hepatoprotective medication silymarin and the anti-ulcer medication omeprazole, as shown in the animal model.[23] The extracts showed low to moderate antioxidant activity and were not cytotoxic. The peel extract's tannin content as well as the pulp extract's saponins, flavonoids, and triterpenes may be responsible for these mitigating effects.[24]

VII. TOXICITY -

According to the information that is currently available, local and tribal people use the fruit and other parts of the *Musa acuminata* plant for non-toxic purposes. Tribal populations around the world eat fruit and other plant parts, despite the fact that they are not very popular.[25] For years, people in Sri Lanka have been enjoying the blossom of the *Musa acuminata* plant in various forms such as curry, boiled, or deep-fried salad. The animal models employed in these studies have come to the conclusion that administering extracts from *Musa acuminata* did not cause any negative effects. The murine monocytic macrophage cell line was shown to be non-toxic to the flowering stalk of *Musa acuminata*. [26]

VIII. CONCLUSION –

The entirety of the information that is currently known about *Musa acuminata* was gathered through electronic searches conducted through PubMed, Scopus, Web of Science, Science Direct, J-Gate, Google Scholar, and a library search for publications that have been published in peer-reviewed journals, regional magazines, unpublished materials, theses, and textbooks on ethno botany. The names databases of the Integrated Taxonomic Information System (ITIS) www.itis.gov, Promusa www.promusa.org, Musalit www.musalit.org, and The Plant List www.theplantlist.org were used to confirm the scientific names and to provide details on the subspecies and cultivars of *M. acuminata*. Therefore, this review could serve as the scientific foundation for upcoming studies on *Musa acuminata* that aim to develop edible products with functional qualities as well as phytomedicines. Therefore, this review could serve as the scientific foundation for upcoming studies on *Musa acuminata* that aim to develop edible products with functional qualities as well as phytomedicines.[27]

The contents of *Musa acuminata* fruits, according to proximate analysis, can help meet daily requirements for vitamins C and minerals like magnesium and potassium. They can also be used as an ingredient in functional foods. The wide variety of phytochemicals found in *Musa acuminata* plant parts may be the cause of their positive health effects, supporting traditional medicine's use of them to treat a range of illnesses.[28]

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