

**AGROTECHNOLOGY OF BANANA (*MUSACEAE*) CULTIVATION AND ITS
MEDICINAL PROPERTIES**

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ABSTRACT: Banana (*Musaceae*) is one of the most widely cultivated plants in tropical and subtropical regions and is valued for both its nutritional and medicinal properties. This article examines the agrotechnology of banana cultivation, its biological characteristics, growth conditions, and medicinal significance. The study analyzes the chemical composition of banana, including essential vitamins (A, B, C, E), minerals (potassium, magnesium, iron), and biologically active compounds. These components play an important role in maintaining human health by supporting cardiovascular function, improving digestion, strengthening the immune system, and stabilizing the nervous system. In addition, the article discusses modern agrotechnological methods of banana cultivation, such as irrigation, fertilization, soil preparation, and harvesting techniques. The results indicate that banana is a plant of high economic and medicinal value, and its scientifically based cultivation can significantly improve productivity and quality.

KEYWORDS: Banana, *Musaceae*, agrotechnology, medicinal plant, vitamins, minerals, nutrition, immunity, cultivation, biological characteristics

**BANAN (*MUSACEAE*) NI YETISHTIRISH AGROTEXNOLOGIYASI VA
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ANNOTATSIYA: Banan (*Musaceae*) tropik va subtropik hududlarda keng tarqalgan qimmatli oziq-ovqat hamda dorivor o'simliklardan biri hisoblanadi. Ushbu maqolada banan o'simligini yetishtirish agrotexnologiyasi, uning biologik

xususiyatlari, o'sish sharoitlari hamda dorivorlik ahamiyati keng tahlil qilingan. Banan o'simligi yuqori hosildorligi, tez o'sish sur'ati va iqlim sharoitlariga moslashuvchanligi bilan ajralib turadi. Tadqiqot davomida bananning kimyoviy tarkibi, jumladan vitaminlar (A, B, C, E), minerallar (kaliy, magniy, temir) hamda biofaol moddalar o'rganildi. Ushbu komponentlar inson salomatligi uchun muhim bo'lib, yurak-qon tomir tizimini qo'llab-quvvatlash, ovqat hazm qilish jarayonini yaxshilash, immunitetni mustahkamlash va asab tizimini barqarorlashtirishda muhim rol o'ynaydi. Maqolada shuningdek bananni yetishtirishning zamonaviy agrotexnologik usullari, jumladan sug'orish, o'g'itlash, tuproqni tayyorlash va hosilni yig'ish bosqichlari yoritilgan. Natijalar shuni ko'rsatadiki, banan o'simligi yuqori iqtisodiy va dorivor ahamiyatga ega bo'lib, uni ilmiy asosda yetishtirish samaradorlikni oshirishga xizmat qiladi.

KALIT SO'ZLAR: Banan, *Musaceae*, agrotexnologiya, dorivor o'simlik, vitaminlar, minerallar, oziq-ovqat, immunitet, yetishtirish, biologik xususiyatlar

АГРОТЕХНОЛОГИЯ ВЫРАЩИВАНИЯ БАНАНА (*MUSACEAE*) И ЕГО ЛЕЧЕБНЫЕ СВОЙСТВА

АЛИМКУЛОВА ЗУХРА ПАНЖИ КИЗИ

СТУДЕНТКА ТЕРМЕЗСКОГО ГОСУДАРСТВЕННОГО УНИВЕРСИТЕТА ИНЖЕНЕРИИ И АГРОТЕХНОЛОГИЙ

АННОТАЦИЯ: Банан (*Musaceae*) является одним из наиболее распространённых растений в тропических и субтропических регионах, обладающим высокой пищевой и лекарственной ценностью. В данной статье рассматриваются агротехнология выращивания банана, его биологические особенности, условия роста, а также лечебные свойства. В ходе исследования изучен химический состав банана, включая витамины (A, B, C, E), минеральные вещества (калий, магний, железо) и биологически активные компоненты. Эти вещества оказывают положительное влияние на организм человека, способствуя укреплению сердечно-сосудистой системы, улучшению пищеварения, повышению иммунитета и нормализации работы нервной системы. Также в статье освещены современные агротехнологические методы выращивания банана, включая орошение, удобрение, подготовку почвы и сбор урожая. Полученные результаты свидетельствуют о высокой экономической и лекарственной ценности банана и необходимости его научно обоснованного выращивания.

КЛЮЧЕВЫЕ СЛОВА: Банан, *Musaceae*, агротехнология, лекарственное растение, витамины, минералы, питание, иммунитет, выращивание, биологические свойства

Introduction

Agriculture and medicinal plant science play a crucial role in ensuring food security and improving human health. In this context, banana (*Musaceae*) is considered one of the most important tropical crops due to its high productivity, nutritional value, and wide range of medicinal properties. Banana is cultivated in many regions of the world and serves as a staple food for millions of people, while also being a valuable source of biologically active compounds beneficial to human health. Banana plants belong to the *Musaceae* family and are characterized by rapid growth, large leaf surface area, and the ability to produce high yields under favorable environmental conditions. The plant thrives in tropical and subtropical climates, where temperature, humidity, and soil fertility significantly influence its growth and productivity. Understanding the agrotechnology of banana cultivation is essential for optimizing yield, improving fruit quality, and ensuring sustainable agricultural practices. Modern agrotechnological approaches to banana cultivation include proper land preparation, selection of high-quality planting material, balanced fertilization, efficient irrigation systems, and effective pest and disease management. These practices not only enhance productivity but also contribute to maintaining soil health and environmental sustainability. In regions with limited water resources or varying climatic conditions, the application of advanced cultivation techniques becomes especially important. In addition to its agricultural importance, banana is widely recognized for its medicinal value.

The fruit is rich in essential vitamins such as A, B-complex, C, and E, as well as minerals like potassium, magnesium, and iron. These nutrients play a significant role in supporting cardiovascular health, improving digestion, boosting immunity, and maintaining the normal functioning of the nervous system. Furthermore, banana contains natural antioxidants and bioactive compounds that help protect the body against oxidative stress and various chronic diseases. Despite its global significance, the effective cultivation of banana requires a thorough understanding of its biological characteristics and environmental requirements. Factors such as soil type, climate conditions, water availability, and agricultural practices directly affect both the yield and the quality of the crop. Therefore, studying the agrotechnology of banana cultivation in relation to its medicinal properties is essential for maximizing its

potential benefits. This article aims to analyze the agrotechnological aspects of banana cultivation and to evaluate its medicinal properties based on its chemical composition and biological activity. By integrating agricultural practices with scientific knowledge of plant chemistry, the study seeks to highlight the importance of banana as both a food and a medicinal resource.

Materials and methods

The research on the agrotechnology of banana (*Musaceae*) cultivation and its medicinal properties was conducted using an integrated scientific approach that combined field observations, laboratory analysis, and comparative evaluation. The study was carried out under conditions representative of subtropical agricultural environments, taking into account soil characteristics, climatic factors, and irrigation practices. Field experiments were organized to observe the growth and development of banana plants under different agrotechnological conditions. Parameters such as plant height, leaf development, time of flowering, and fruit formation were systematically recorded. Special attention was given to soil preparation methods, including plowing depth, organic matter incorporation, and drainage conditions. Fertilization practices were also evaluated, focusing on the application of nitrogen, phosphorus, and potassium fertilizers in balanced proportions. Irrigation regimes were analyzed based on water requirements during different growth stages of the plant. Drip irrigation and traditional watering methods were compared to determine their efficiency in maintaining soil moisture and improving yield. Pest and disease control measures were also examined using environmentally friendly and sustainable approaches. For the study of medicinal properties, laboratory analysis was conducted to determine the chemical composition of banana fruits. Standard analytical methods were used to identify and quantify vitamins (A, B-complex, C, and E), mineral elements (potassium, magnesium, and iron), and antioxidant compounds. The biological activity of these components was evaluated based on their known physiological effects on the human body. Additionally, a comparative analysis of scientific literature was carried out to support the experimental findings and provide a broader understanding of banana cultivation practices and medicinal value. Statistical methods were applied to ensure the reliability and accuracy of the collected data.

Results

The results of the study showed that banana plants demonstrate high productivity when cultivated under optimal agrotechnological conditions. Proper soil preparation, adequate fertilization, and efficient irrigation significantly improved plant growth, leaf development, and fruit yield. Plants grown under drip irrigation systems exhibited better water efficiency and higher productivity compared to those under traditional irrigation methods. The analysis of growth parameters revealed that banana plants require a consistent supply of nutrients and moisture throughout their growth cycle. The application of balanced fertilizers resulted in increased plant vigor, larger fruit size, and improved overall quality. In addition, proper pest and disease management contributed to reducing crop losses and maintaining plant health. Laboratory analysis confirmed that banana fruits contain a high concentration of essential nutrients. Potassium was found to be the dominant mineral, playing a key role in regulating blood pressure and supporting heart function. The presence of vitamins such as vitamin C and B-complex vitamins contributes to improved metabolism and immune system function. Furthermore, antioxidant compounds identified in banana fruits indicate their potential in reducing oxidative stress and preventing cellular damage. These findings support the use of banana not only as a nutritional food source but also as a functional product with medicinal benefits.

Discussion

The findings of this study highlight the importance of applying modern agrotechnological practices in banana cultivation to achieve high yield and quality. The positive impact of proper soil management, balanced fertilization, and efficient irrigation demonstrates that agricultural productivity can be significantly enhanced through scientifically based methods. The results also confirm that banana is a plant of considerable medicinal value due to its rich chemical composition. The high content of potassium supports cardiovascular health, while vitamins and antioxidants contribute to overall well-being and disease prevention. These properties make banana an important component of a healthy diet and a valuable resource in natural medicine. The observed relationship between cultivation conditions and nutrient accumulation suggests that agrotechnological practices directly influence not only yield but also the nutritional quality of the fruit. This emphasizes the need for integrated approaches that combine agricultural techniques with knowledge of plant physiology and biochemistry. In addition, the use of sustainable and environmentally friendly cultivation methods can improve long-term soil fertility and reduce negative environmental impacts. This

is particularly important in regions where natural resources are limited and climate conditions are variable. However, further research is required to explore advanced cultivation technologies, improve resistance to pests and diseases, and optimize post-harvest handling techniques. Future studies should also focus on expanding the use of banana in pharmaceutical and functional food industries. Overall, the study demonstrates that banana (*Musaceae*) is not only a highly productive agricultural crop but also a plant with significant medicinal potential, making it an important subject for continued scientific research and practical application.

Table. Agrotechnological requirements and medicinal properties of banana (Musaceae)

Parameter	Description	Agrotechnological importance	Medicinal significance
Climate conditions	Tropical and subtropical regions	Ensures optimal growth and high productivity	Influences nutrient accumulation
Soil type	Well-drained, fertile, loamy soil	Supports root development and plant stability	Affects quality of bioactive compounds
Irrigation	Regular watering, drip irrigation preferred	Maintains soil moisture and increases yield	Enhances nutrient uptake
Fertilization	Balanced NPK fertilizers	Promotes plant growth and fruit development	Improves nutritional value of fruits
Growth period	9–12 months	Determines harvesting cycle	Influences chemical composition
Vitamins (A, B, C, E)	High content	Reflects plant health	Boosts immunity and metabolism
Potassium (K)	Very high	Indicates nutrient-rich soil conditions	Supports heart function and blood pressure regulation
Magnesium (Mg)	Moderate	Contributes to chlorophyll production	Supports muscle and nerve function

Antioxidants	Present	Reflects plant stress resistance	Reduces oxidative stress and chronic disease risk
Fiber content	High	Indicates fruit quality	Improves digestion and gut health

Conclusion

The study demonstrates that banana (Musaceae) is a highly important agricultural and medicinal plant with significant economic and health benefits. The application of proper agrotechnological practices, including soil preparation, balanced fertilization, and efficient irrigation, plays a key role in achieving high productivity and improving fruit quality. The findings confirm that banana is rich in essential nutrients such as vitamins, minerals, and antioxidants, which contribute to its medicinal value. Its high potassium content supports cardiovascular health, while the presence of vitamins and dietary fiber enhances digestion, strengthens the immune system, and improves metabolic processes. These properties make banana not only a staple food but also a valuable functional and лечебный продукт. Furthermore, the study highlights the direct relationship between cultivation conditions and the nutritional quality of banana fruits. This indicates that scientifically based agricultural practices can significantly enhance both yield and medicinal properties. Sustainable cultivation methods also contribute to environmental protection and long-term agricultural stability. In conclusion, banana (Musaceae) represents a promising resource for both agriculture and medicine. Its effective cultivation and utilization can play an important role in improving food security, human health, and economic development. Further research is recommended to optimize cultivation technologies and expand its application in the pharmaceutical and food industries.

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