The potential of biotechnology in the context of sustainable development

Magomed Suleymanov[1,*], *Luiza* Molochaeva[2], and *Albina* Altueva[3]

[1]Dagestan State University, Makhachkala, Russia
[2]Kadyrov Chehchen State University, Grozny, Russia
[3]Kabardino-Balkarian State University named after H.M. Berbekova

Abstract. In recent years, interdisciplinary research has gained great importance because it has much in common with new advances in science. Technologies that allow for technological breakthroughs and advanced development of scientific and technical groundwork for the development of fundamentally new materials (products), technologies at the junction of various subject areas that involve qualitatively new effects can be developed using similar techniques. For example, nanobiotechnologies are technologies that make it possible to produce materials with desired properties and use them in the future to create nanodevices; bioinformatics - building computers or information processing networks to obtain information from biological objects. In particular, biotechnology covers such areas as microbial genomics and bioinformatics; engineering enzymemology and modeling, biocatalysis of metabolism.

1 Introduction

On the way to economic modernization of Russia, biotechnologies play an important role (fig.1) . The development of industrial sectors such as medicines and cosmetics, they are a powerful lever for economic development. In the development of industrial sectors such as medicines and cosmetics, they are a powerful lever for economic development. It is. Biotechnology can solve energy problems by creating cheap biosynthetic gas, that is an important raw material for microbiological industry in the production of protein-lipid feed preparations and food products. This is an important raw material for microbiological industry in the production of protein-lipid feed preparations and food products [1]. I use this ingredient in the microbiological industry (fig.2), which is also used as an ingredient for the microbiological industry in the production of protein-lipid feeding prepares and food products. A two-type of ethyl alcohol is produced in Brazil, the ethyl alcohol is non-hydrogenated and hydrated. A special motor running on ethyl alcohol is used as an additive to gasoline, but at the same time it has its own special motor that works on alcohol. After the beginning of the mid-1970s, alcoholic beverages have played an important role in Brazil's economy since then [3]. It is possible to get waste water from alcohol, starch or beer. They are rich in carbohydrates: proteins and amino acids. The energy in the form of nutrients provides them with energy. Energy in the form of nutrients provide energy to

*Corresponding author fefnews@mail.ru

them. It is known that waste materials in the metallurgical and industrial industry can contain toxic or explosive substances. Waste materials in the metallurgical and chemical industry can contain toxic or explosive substances. Waste products from chemical and metallurgical industries may contain large amounts of toxic or explosive substances [3]. For example, the pollution occurs if iron-copper and tin metal compounds (iron, copper and tin) enter the environment.

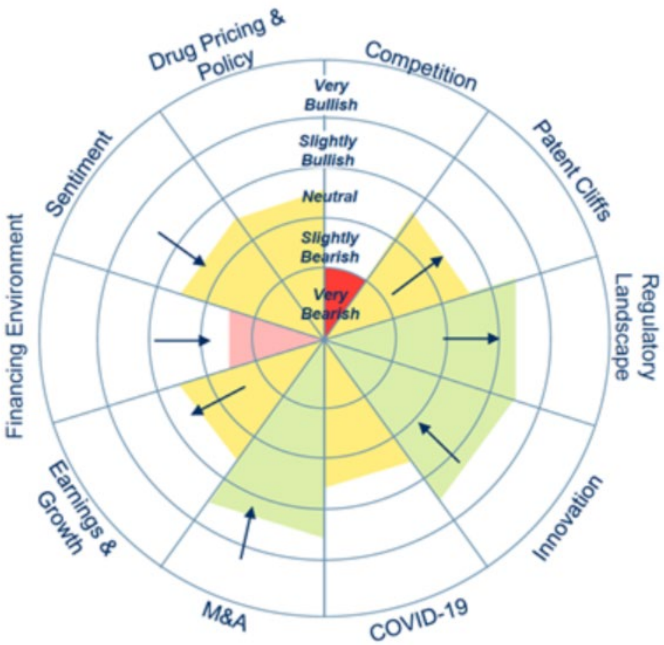

Fig. 1. Biotech 2023

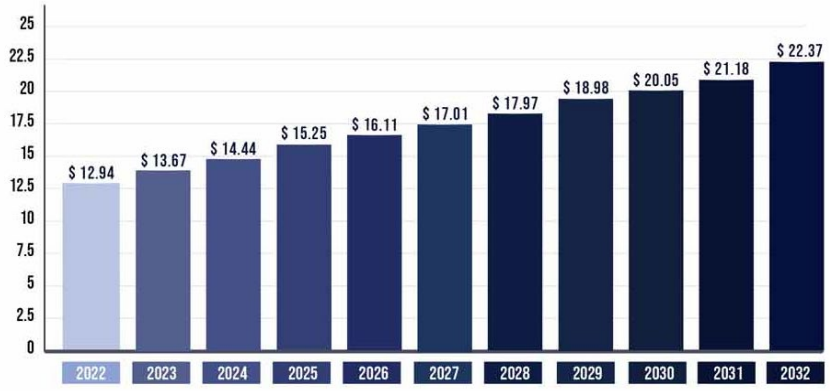

Fig. 2. Industrial Microbiology Market Size By 2032

The pollution occurs if heavy metal compounds (iron, copper and tin) enter the environment. If heavy metal compounds (iron, copper and tin) enter the environment, a lot of pollution occurs. After purifying wastewater, the soluble and insolubly contained components of water are removed so that they do not harm humans or water bodies. The solution and insoluble components of wastewater are removed so that they do not harm

humans or water bodies. It is not chemical reagents, but biosensors. It is not chemical reagents that are used to detect pollution from different origins, but biosensors. New Semiconductor has been initiated, performing a new type of Semiconductor, conducting the function in which proteins perform. This system has a faster speed than silicon-silicon Semiconductors in enzyme systems. Biochips are small in size but reliable and capable of self-assembly, although they are not large in size. But they are not so big as it seems to me. Biotechnology in food industry cannot be overestimated. The benefits of biotechnology in food industry cannot be overestimated. At the moment, it is not possible to underestimate the usefulness of biotechnology in the food industry [4]. Microorganisms help to obtain a wide range of food products. The Microorganism Helps To Obtaining A Wide Range Of Food Products.

2 Research methodology

Emmanuelle Charpentier is the co-inventor of the CRISPR-Cas9 method and the 2020 Nobel Prize in Chemistry winner with Jennifer Doudna.

Svante Pääbo is a geneticist who studies the evolution and genetic sequences of ancient humanoid creatures.

Eric Lander is a doctoral biologist and geneticist working in the field of genetic engineering. His field of activity is the role of genes in many biological processes.

The following methodology outlines the key steps and methods used in conducting this study:

Literature Review: A comprehensive review of peer-reviewed academic papers, research articles, reports, and case studies related to biotechnology and sustainable development was conducted. This step helped establish the current state of knowledge and identify research gaps.

Data Collection: Relevant data related to biotechnological applications, their impact on sustainability, and case studies were collected. Data included both quantitative (e.g., statistical data on biotech industry growth) and qualitative information (e.g., case descriptions).

Case Studies: Several case studies from different regions and sectors were analyzed to provide real-world examples of how biotechnology contributes to sustainability. These case studies helped illustrate practical applications and outcomes.

Data Analysis: Data collected from the literature review and case studies were subjected to qualitative and quantitative analysis. Statistical tools were used to analyze industry growth, economic impacts, and trends in biotechnology.

Expert Interviews: Interviews were conducted with experts in the fields of biotechnology, environmental science, healthcare, agriculture, and economics. These interviews provided insights into the current and potential contributions of biotechnology to sustainability.

Frameworks and Models: Existing sustainability frameworks, such as the United Nations Sustainable Development Goals (SDGs), were used as a reference point to evaluate the impact of biotechnology on various aspects of sustainability. Modeling techniques were employed to assess the potential future impact.

Ethical and Regulatory Assessment: An examination of ethical considerations and regulatory frameworks surrounding biotechnological applications was undertaken to understand the challenges and ethical implications involved.

Comparative Analysis: A comparative analysis was conducted to assess the relative importance and effectiveness of various biotechnological applications in contributing to different dimensions of sustainable development.

Interdisciplinary Approach: This study adopted an interdisciplinary approach by integrating insights from diverse fields, including biology, chemistry, economics, environmental science, and policy analysis. This approach facilitated a comprehensive understanding of the topic.

Synthesis and Reporting: The findings from the literature review, data analysis, case studies, and expert interviews were synthesized to draw conclusions about the role of biotechnology in sustainable development. The results were reported in a structured and coherent manner.

Limitations and Future Research: The study acknowledges its limitations, such as the scope of analysis and the potential bias in data sources. Areas for future research and opportunities for further investigation in the field of biotechnology and sustainability were identified.

This research methodology aimed to provide a holistic and evidence-based exploration of the potential of biotechnology in the context of sustainable development. It sought to elucidate the multifaceted contributions of biotechnology, both current and prospective, and their implications for building a more sustainable and resilient future.

3 Results and Discussions

Biopolymers have a great advantage over plastics as they are non-toxic and can degrade after use without polluting the environment. The construction of the necessary genes will make it possible to control the vital activity of not only plants, but also animals, and create new organisms with different properties [5].

In technology development of domestic economic development, it is one among the most promising and promising regions in technology development of domestic economic development, that at this stage should be implemented with special attention. For example, biotechnologies are becoming an important direction in development of countries whose economies are most economically well-developed. At the same time, along with this revolution that is occurring in global business at current moment and as part of it will be biotechnologies. To develop more economically well-developed economies and regions, the main goal for such countries is to develop more economically well-developed economies and regions. The main goal of such countries is [6]. The driving forces for development are:1) energy and industry in cheap raw materials; 2) energy security, energy security. 3) environmental problems (the need for the development of regions and countries); 4) ensuring public health, social services.

It was created due to its presence, on the one hand, to an emergent need for expanding the range of raw materials (primary and second biomaterials) used by traditional production methods in polymeric material. As it is due thereby that this situation occurred. This is the reason for it [7]. Because of the development of new requirements, this is the reason for it. In 2020 the market for biopolymers (organic polymer products made from renewable resources) will grow by 8-10% per year, and its share in total polymer production is 25-30%. In the year, the volume of this market is about 10-20%. The volume of this market is about 10-20% per year. Also, in the event of decreases hydrocarbon resources over time, the development of mechanisms for biological production and energy at the present stage can be an important key to completely develop Russian economy in future. At the moment, about 2-2.5% of energy consumption in global countries is increasing. Oil 0.5-1% oil 0,5% natural gas 1.5-2 % coal 2.5-5 percent. The problem is not only about energy, but also biotechnology. This can be one solution for solving this issue in the future (Table 1).

Table 1. Problems of industrial biotechnology and possible solutions

Problems	Weakness of Industrial biotechnology	Possible solutions
Microorganisms grow too slow	Slow: production takes days	Minimizing the microbial cells
Microbes can not use mixed substrates	Agricultural products are mostly mixed substrates	Assembling pathways that can metabolize mixed substrates
Low conversion of substrates to products	Cell metabolism turn substrates into CO_2, H_2O & byproducts	Removing unnecessary pathways consuming substrates
High Consumption on fresh H_2O	Fresh H_2O as medium et al.	Utilization of sea water for cell growth
Microbial cells grow to very low density	Product concentration low: Several mg to 100 g/L	Minimizing oxygen demand for aerobic cells & reducing Quorum sensing effects
Discontinuous processing	Contamination concerns	Developing continuous process
Sterilization costs high	High pressed steam	Contamination resisting strains grown in open systems
High energy demand for intensive aeration	Aerobic microorganisms need a lot of oxygen for growth	Developing anaerobic bioprocesses
Difficulty to control the bio-processes	Complicated cellular metabolisms	Artificial cells that contain only necessary metabolic pathways
One product by one microbial organism	Different organism has different strength.	Development of a platform organism for many products
Organisms consume food related products	Food for Fuels (Chemicals)	Kitchen wastes or activated sludge as substrates
Production facility costly	Costly materials and sensors	The use of carbon steel facilities et al.

On the basis of agricultural biotechnology, it is possible to increase the effectiveness and achieve economic development: reduce energy intensity in production process, improve social indicator: creating jobs with appealing conditions; improving education as wellas knowledge on its own. Synthetic detergent products, textiles and polymer materials have shown an increased 45-60% decrease of pollutant and greenhouse gas emissions compared to the standard technology source. [8] The study of some sectors (textile dentergent, plasticizer chemical products), as well research in other regions (fuel systems for food, oils and polymer) are included in the list. For example, studies in some sectors (textile dentergents, textiles, plasticizer). In order to achieve the positive effect of biotechnologies in all spheres of human life, many countries have begun development it. There is an active development by this technological direction in recent years, for many countries of the world. Among the main reasons for this is a manifestation of interest in development and development of this technological area from United States, as leader and countries of the European Union. Japan, Europe, etc are also participants in it. As a result of this, Russia, which has achieved great results in the field of such technology at an unprecedented stage, is not participating in this process. Russian bioindustry is 70th in the world according to this, Russia is 70th in terms of development of bioindustry [9]. For 5 years, in the past it provides less than 0.5% from the world's production of biotechnological products, but five years ago it was 5-8%. Statistics show that Russia has a great potential for the formation of this industry. The statistics show, in fact, that Russia has a great potential for the formation of this. During 2010, the volume of biotechnological products in Russia was 1.6 billion dollars (an upwardly +11% from 2009 is observed), more than 90% are supplied through imports, and most were produced for domestic production [10]. For the first time since 2008, it was 1.6 billion dollar. In the supply of imported products, they can satisfy 89% of the demand for biopharmaceutical products, 90% of the need for agrobiotechnology and biochemical products, 93% of the consumers of agrobiotechnology and biochemical products, 89% of the consumed enzyme.The amount of imported products is about 90%. For biotechnological products, a strong demand has been developed in Russia. The main prerequisite for the formation of this industry and the organization of production in the national economy is that it has to be organized by the government. The largest potential in terms of market needs is the biopharmaceuticals (65%) and agricultural biotechnology (20%). The area of other areas (industrial, industrial-mining forestry and forests), in addition to the region of other areas (industrial, industrial-mining forestry [11]. In the list of

others, other regions (industrial or) They occupy only 15% in total and have a smaller market share.

4 Conclusions

It is important to note that measures aimed at supporting this sector of the economy require special attention. The USA has a number of programs that provide effective assistance to small and medium-sized enterprises in all sectors of development, with a special focus on biotechnology. Under these programs, the U.S. government allocates various grants during the business development period or as part of individual budget plans. Similar programs aim to strengthen and expand the capacity of relationships between national research institutions and the SME sector through public-private partnerships. Similar programs are organized through public-private contracts to strengthen the relationship between non-profit research institutes and the SME sector and expand their profitability. Bioindustry support programs in the U.S. also vary in their level of implementation.

The following key conclusions can be drawn from the discussion:

- Biotechnology as a Sustainability Enabler: Biotechnology has emerged as a powerful tool for achieving various aspects of sustainable development. It contributes to environmental protection, resource conservation, improved healthcare, and economic growth.
- Environmental Benefits: Biotechnological applications, such as bioremediation and biofuels production, have the potential to mitigate environmental degradation and reduce the ecological footprint of various industries. They offer innovative solutions for pollution control and sustainable agriculture.
- Resource Efficiency: Biotechnology can enhance resource efficiency by minimizing waste generation and optimizing resource use in industrial processes. This is particularly relevant in a world with increasing resource constraints.
- Healthcare Advancements: Biotechnology has revolutionized healthcare through the development of biopharmaceuticals, precision medicine, and advanced diagnostics. It has the potential to address global health challenges and improve the quality of life.
- Agricultural Sustainability: Biotechnological innovations, including genetically modified crops and precision agriculture, can contribute to food security and sustainable farming practices. They offer resistance to pests, reduce the need for chemical inputs, and enhance crop yields.
- Economic Growth: Biotechnology-driven industries have witnessed substantial economic growth. The biotech sector attracts investments, fosters innovation, and creates job opportunities, thus contributing to economic development.
- Challenges and Ethical Considerations: While biotechnology holds enormous promise, it is not without challenges. Ethical considerations, biosafety concerns, and regulatory frameworks must be carefully addressed to ensure responsible biotechnological applications.
- Global Collaboration: The article underscores the importance of international collaboration in harnessing the potential of biotechnology for sustainable development. Sharing knowledge, expertise, and resources can accelerate progress in this field.
- Future Outlook: Biotechnology is expected to continue evolving and playing a pivotal role in addressing emerging global challenges, including climate change, infectious diseases, and food insecurity. Its adaptability and innovation will be crucial in shaping a sustainable future.

- Policy and Investment: Governments and stakeholders must prioritize policies that support biotechnological research, development, and responsible deployment. Investments in biotechnology education and infrastructure are essential for long-term sustainability.
- In summary, biotechnology has transcended traditional boundaries and emerged as a multidisciplinary field that offers transformative solutions for sustainable development. Its potential to address environmental, economic, and societal challenges makes it a cornerstone of global efforts to build a more sustainable and resilient world. As biotechnology continues to advance, its responsible and ethical application will be paramount in realizing its full potential while ensuring a harmonious coexistence with the planet and its inhabitants.

References

1. A. A. Daukaev, R. Kh. Dadashev, L. S. Gatsaeva, R. A. Gakaev, IOP Conf. Series: Earth and Environmental Science, 378 (2019)
2. A. Yu. Apokin, D. R. Belousov, Scenarios for the development of the world and Russian economy as a basis for scientific and technological forecasting, **3(3)**, 12–29 (2009)
3. Bio-Economy Technology Platforms. The European Bioeconomy in 2030: Delivering Sustainable Growth by addressing the Grand Societal Challenges (2021)
4. C. Cagnin, E. Amanatidou, M. Keenan, Orienting European Innovation Systems towards Grand Challenges and the Roles that FTA Can Play, **39(2)**, 140–152 (2020)
5. E. Reynard, M. Panizza, Geomorphosites: definition, assessment, and mapping. Geomorphol Relief , 177–180 (2018)
6. EU-Russia Energy Dialogue, Energy Forecasts and Scenarios 2009–2010 Research. Final Report (2021)
7. K. Haegeman, F. Scapolo, A. Ricci, E. Marinelli, A. Sokolov, Quantitative and qualitative approaches in FTA: from combination to integration?, **80**, 386–397 (2021)
8. R. Kh. Ilyasov, Spline modeling and analysis of relationships in the economy with the possible presence of regression switching points, **11(4)**, 165-175 (2018)
9. K. M.-S. Murtazova, Ecological and economic assessment of sectoral agricultural technologies, **3(15)**, 68-71 (2021)
10. A. S. Salamova, Socio-economic factors in the fight poverty and hunger in the modern world: the scientific approach of Amartia Kumar Sen, **17(1)**, 237-245 (2023)
11. A. S. Salamova, Global networked economy as a factor for sustainable development, 03053 (2020)
12. A. B. Ankudinov, B. S. Bataeva, The Manager, **12(2)**, 35-45 (2021)