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The Interrelationship Between Environment and Biotechnology

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ARTICLE ID: 48

Summary

Biotechnology is the study of ways to alter or modify living things for human use. The field of biotechnology deals with developing new technologies using biological systems in living things. Biotechnology is used in a wide range of fields, from agriculture to medicine. biotechnology has changed humanity and improved human well-being. By the time the disease is recognized, the pathogen concentration has frequently increased. Antigens that can be employed as edible vaccines can be produced by transgenic plants. A pathogen that can be employed in attenuated or dead forms includes vaccines. Biotechnology makes it simple to develop tools that can properly forecast diseases and alter the course that disease takes. Scientific tracing techniques enable scientists to determine the genesis of an illness. Eco-friendly sources for agriculture include bio-fertilizers and bio-pesticides, which contain living microorganisms that aid in stimulating growth by boosting the supply or availability of essential nutrients. Biotech crops are preferred by farmers because they produce more with less effort.

Introduction

The study of living creatures is often the focus of life science known as biotechnology. To alter or modify items for a particular human use, biology and other techniques are applied. Biological technology is another name for biotechnology. The employment of bacteria to generate cheese (food preservation), natural enzymes in yogurt, yeast to produce bread, fermentation to produce wine and beer, and plant and animal breeding are the origins of "biotechnology." There are 1,473 companies and 198,300 employees as of today, and 300 biotechnology drugs and vaccines are undergoing clinical trials under FDA supervision. The

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use of technology to enhance biological organisms, change an organism's biological function by introducing genes from another organism, manipulate living things and organic matter to meet human needs, and the methods applied by the biotechnology sector to change genes and introduce them into transgenic organism's gene therapy, cancer therapy, and stem cell therapy are recent therapeutic applications of biotechnology. The field of biotechnology deals with developing new technologies and using them in various fields by utilizing biological systems found in living things. These technologies are used in a wide range of fields, from agriculture to medicine. Through its various inventions, biotechnology has impacted daily life. The field of science has been completely expanded by biotechnology. The use of biotechnology in agriculture is extremely widespread. To reduce the need for pesticides, BT crops have been introduced.

The main goal of biotechnology crops is a modest yield of grains. Tomato production and stability have grown as a result of the introduction of genes that extend shelf life. Additionally, offered on the market are BT brinjals. The number of livestock produced has multiplied greatly. The development of biotechnology has made genetic investigations fairly easy. A variety of biotechnology techniques have improved milk quality. Climate-smart plants that can adapt to most settings have been created using biotechnology. Through the diagnosis and treatment of diseases, biotechnology has significantly improved human life. The development of new medications, such as insulin and generation 3 antibiotics, has simplified the management and treatment of human disease. Vaccines are the newest and most significant medical discovery. Modern biotechnology makes it possible to develop the tools required to fight rare and crippling diseases, reduce negative environmental effects, get cleaner and safer energy, and improve manufacturing processes. More than 250 goods are currently made using biotechnological techniques. These techniques can help prevent and treat rare diseases in the medical field. Biotechnology's Importance in Human Life Since its creation, biotechnology has changed humanity and is crucial to human well-being. It greatly benefits human well-being and health requirements.

A few of them are listed below:

Biotechnology in agriculture

The use of biotechnology in agriculture serves to enhance the processing, production, and quality of food. Eco-friendly sources for agriculture include bio-fertilizers and bio-

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pesticides, which contain living microorganisms that aid in stimulating growth by boosting the supply or availability of essential nutrients. Biotech crops are preferred by farmers because they produce more with less effort. Various strategies have been put in by researchers to increase food production. Agriculture based on genetically modified crops is a choice, along with agrochemical-based agriculture and organic agriculture. The green revolution attempted to increase food production, but it was unable to keep up with the rising demand. The case of BT Cotton is one of the most prevalent examples. BT stands for Bacillus Thuringiensis, a microorganism that, when injected into plants, helps them resist pests like maize borer and bollworm. Thus, genetically engineered crops aid in streamlining the entire agricultural process. The use of biotechnology in agriculture has produced a wide range of GMOs, such as plants that are resistant to pests and diseases.

Biotechnology in livestock

The most important technology in generating enough food to feed the world's expanding population is biotechnology. The biotech marvels in cattle are gender pre-selection and cloning gene mapping procedures. The ability to cryopreserve genetic material is another benefit of biotechnology. It is shown that the twenty-first century is the era of genomic selection and the use of molecular genetic markers. Through the use of biotechnology, cattle can produce methane and boost milk output through genomic selection.

Biotechnology in healthcare

Biotechnology has been extensively exploited in the creation of numerous cutting-edge methods for identifying, treating, and preventing diseases in the area of medicine. The development of new medications and recombinant vaccines aids in the provision of efficient cures and disease-prevention strategies. Gene therapy, recombinant vaccines, DNA vaccines, bioinformatics, genomics, proteomics, biopharmaceuticals, and biomedicine are the key areas of medical biotechnology, each of which requires a thorough explanation. Today, biotechnology is helping to rapidly expand medical advancements. Molecular medicine will gradually take the place of traditional medicine. Shortly, no disease will have an unidentified cause or an unpredictable disease mechanism. Traditional medicine is mostly focused on identifying disease signs and symptoms to establish a disease and pathogen. Biotechnology is now being used by medical research to identify the most extreme illness presentations. Since the human genomes full sequence was discovered in 2001, biotechnologists have been able to

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identify the genes responsible for many distinct features and abnormalities. Numerous genes that contribute to the development of diseases, such as cancer, cardiovascular, respiratory, and mental illness, have so far been discovered. The identification of certain genes and the resulting proteins from those genes enables the development of highly specialized and efficient drugs (tailored) to treat disease. Protein phenotypes and levels are involved in these drugs. There are several uses for biotechnology in the medical industry.

Reconstituted insulin

Diabetic individuals need insulin to get rid of extra sugar in their blood. Patients with diabetes have very low or no insulin production in their bodies. As a result, individuals require exogenous insulin to manage their blood sugar levels. Later, it was found that humans could use the insulin produced by pigs pancreas. However, there weren't enough pigs to produce the necessary amounts of insulin. The human insulin gene was cloned as a result of this. E. coli bacteria were given the precise gene sequence that codes for human insulin. The E. coli cells' genetic makeup was changed by the gene sequence. Several E. coli bacteria with the recombinant human insulin gene were created in less than 24 hours. From E. coli cells, the recombinant human insulin was isolated.

Gene therapy

Gene therapy is currently being studied as a treatment option for several hereditary illnesses. With the aid of vectors like retrovirus, adenovirus, and herpes simplex viruses, gene therapy is used to treat genetic problems by inserting a normal gene or the proper gene for the defective or inactive gene into the patient. Candidates for gene therapy include illnesses such as cystic fibrosis, Duchenne muscular dystrophy, Huntington's disease of the neurological system, thalassemia, hemophilia, sickle cell anemia, Lesch-Nyhan syndrome, phenylketonuria, etc. Genetic-metabolic illnesses, in which an incomplete gene results in a lack of synthesis, incomplete synthesis of one protein, or lack of a chemical reaction, are given increasing consideration in gene therapy. The functioning gene takes the place of the damaged or inactive gene. If the treatment is started in the earliest stages of life, it has the best potential to produce a long-lasting cure.

Genetic analysis

Another use of biotechnology in the medical field is medical diagnostics. By the time the disease is recognized, the pathogen concentration has frequently increased. As a result, for

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a treatment to be effective, early identification and understanding of pathophysiology are crucial. Techniques like recombinant DNA technology, polymerase chain reaction (PCR), enzyme-linked immunosorbent assay (ELISA), etc. can aid with this. Pharmacogenomics: drugs that are best matched to a person's genetic makeup have been created. It can be used to treat conditions like cancer, depression, HIV, asthma, and more.

Vaccines

Vaccines are made using cell cultures and animals. Inactivated pathogens are present in these vaccinations. Antigens that can be employed as edible vaccines can be produced by transgenic plants. Plants like tomatoes and bananas can express antigenic proteins from a variety of diseases. Animal foot and mouth disease can be treated using transgenic sugar beet, and cholera and hepatitis B can be treated with transgenic bananas and tomatoes. The first smallpox vaccination was given to humans in 1797. A pathogen that can be employed in attenuated or dead forms includes vaccines. The disruption of the cellular and humoral immune systems by the vaccine results in resistance to the disease. Smallpox, polio, measles, and tetanus were only a few of the deadly illnesses that were either managed or eliminated from human communities. Technology for vaccines has long been used. The smallpox ulcers of ancient Chinese patients were used to immunize healthy people. However, Edward Jenner started modern vaccination in 1798 by utilizing the cowpox virus to immunize people. The creation and production of new vaccinations, such as recombinant vaccines and DNA vaccines, began with the advancement of science in the fields of biotechnology, genetic engineering, and bioinformatics. Biotechnology has aided in understanding how the SARS-CoV-2 virus responds to vaccinations. This has aided in the quicker creation of COVID-19 vaccinations that may be distributed to the general public. The National Institute of Virology (NIV) and the Indian Council of Medical Research (ICMR) collaborated on the development of COVAXIN, a locally produced COVID-19 vaccine by Bharat Biotech (NIV). COVISHILD The Indian version (SII) was created by Oxford-AstraZeneca, and the Serum Institute of India disseminated the Indian version (SII). COVISHILD's manufacturing process sets it apart from COVAXIN. While the inactivated Coronavirus is a component of COVAXIN, COVISHILD is manufactured using a viral vector derived from a chimpanzee virus. The viral vector in COVISHILD imitates the brand-new coronavirus rather than using the dormant coronavirus. Understanding the transmission of illnesses and their potential lethality for humans has been made possible by biotechnology.

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Drugs

Biotechnology makes it simple to develop tools that can properly forecast diseases and alter the course that disease takes. Scientific tracing techniques enable scientists to determine the genesis of an illness. Biotechnology's collaboration with other fields makes it possible to use inter-field research to find solutions to issues that are typically intractable by a single field. For instance, it has been discovered that AI technologies may link existing medications to the microorganisms that cause COVID-19. A technique called drug repositioning was also used to repurpose medications. The treatment of COVID-19 involved the use of approved drugs that were also being utilised to treat other conditions. The FDA has approved Remdesivir, an antiviral drug, to treat COVID-19 in adults and children 12 years of age and older. Patients with COVID-19 hospitalizations who require oxygen assistance or who have a higher risk of contracting a major illness may be prescribed Remdesivir. A skin-piercing needle is used to administer it.

Conclusion

These technologies are used in a wide range of fields, from agriculture to medicine. To reduce the need for pesticides, BT crops have been introduced. The main goal of biotechnology crops is a modest yield of grains. Climate-smart plants that can adapt to most settings have been created using biotechnology. The use of biotechnology in agriculture serves to enhance the processing, production, and quality of food. Biotech crops are preferred by farmers because they produce more with less effort. The most important technology in generating enough food to feed the world's expanding population is biotechnology. The biotech marvels in cattle are gender pre-selection and cloning gene mapping procedures. Shortly, no disease will have an unidentified cause or an unpredictable disease mechanism. Biotechnology is now being used by medical research to identify the most extreme illness presentations. Diabetic individuals need insulin to get rid of extra sugar in their blood. Gene therapy is currently being studied as a treatment option for several hereditary illnesses. Another use of biotechnology in the medical field is medical diagnostics. By the time the disease is recognized, the pathogen concentration has frequently increased. Antigens that can be employed as edible vaccines can be produced by transgenic plants. A pathogen that can be employed in attenuated or dead forms includes vaccines. Biotechnology makes it simple to develop tools that can properly forecast diseases and alter the course that disease takes. Scientific tracing techniques enable scientists to determine the genesis of an illness.

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