

# The Application of Biotechnology for Sustainable Future

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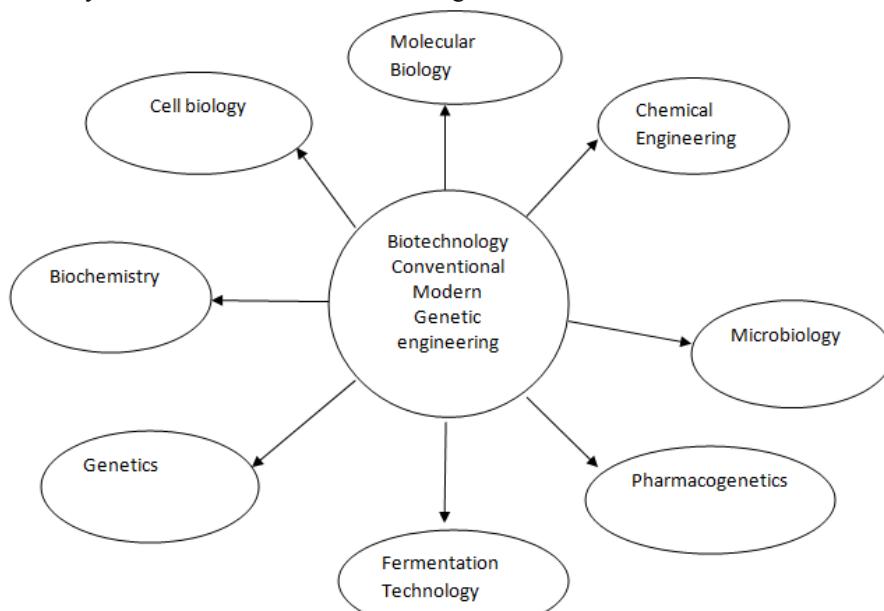
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**Abstract:** As the industrialization increase globally there is severe threat to land resources. To make our world a more suitable habitat and sustainable ecosystem for our next generation we have to make development in preexisting methods along with we have to go for natural remedy to eliminate hazardous substances from the environment in natural way. Sustainable development has been prioritized by top governments around the world. Biotechnology has taken a prominent place among the different strategies used to attain the objective of sustainability, particularly in the fields of bioremediation and food production, renewable raw materials, energy production, prevention of environmental pollution, biofuels, Biopesticides, genetically modified plants and animals, Biofertilizers, and Bioplastics. However, there are still certain technical and financial concerns to be resolved. This paper discusses biotechnology applications for a more sustainable future..

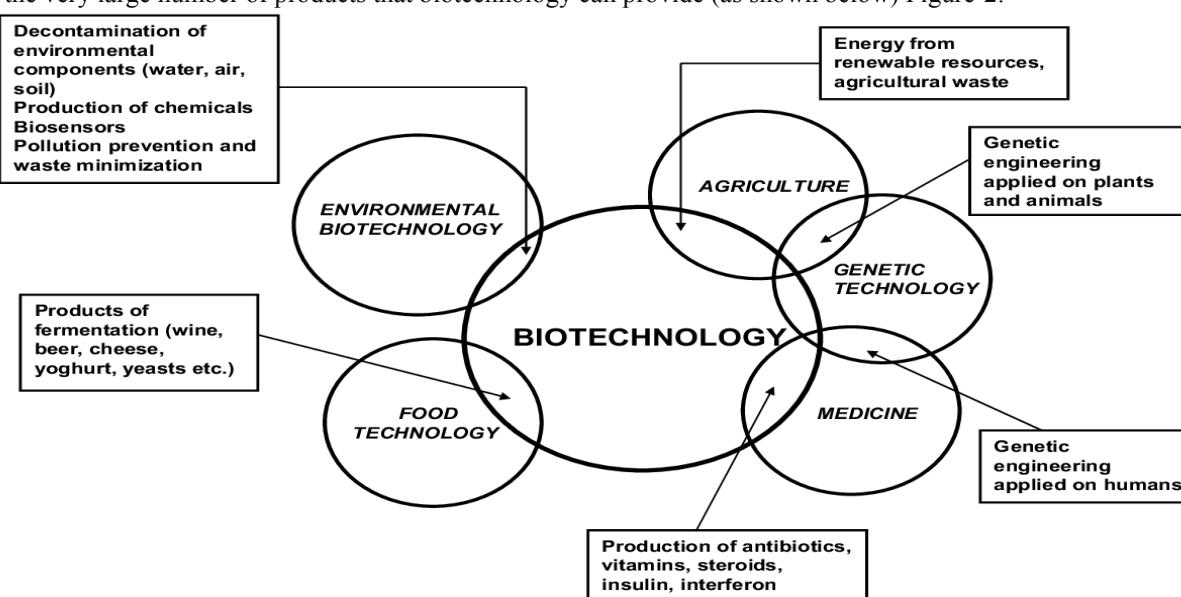
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## I. INTRODUCTION

As we are aware of the humongous issues hovering over world, is it being increase population, excessive industrialization or capitalism. All of this has resulted in poverty, starvation, environmental degradation, health problems, epidemics, and other problems. If we want to overcome these problems, we must focus on sustainable development. The sustainability challenges to fulfill the demand of increasing population by enhance production per hectare agriculture area without negative impact on the environment for next generation. And this difficult problem cannot be solved until we adapt new age technology and one of them is biotechnology. Biotechnology is Meta field which is composed of many subfields such as shown in the figure1.



All of above field can help humanity to achieve sustainable development and preserve environment. The same is true for the very large number of products that biotechnology can provide (as shown below) Figure-2.



Biotechnology has become a critical instrument for sustainable development in a variety of domains, including agriculture, the environment, industry, and human health, as a result of the aforementioned two factors. Humankind now has the potential to change the structure of life itself thanks to biotechnology, which is the application of an explosion of biological knowledge. Whether biotechnology proves to be a blessing or a curse is determined by how it is used and regulated. It is a mix of these two elements, i.e. the multidisciplinary nature and the wide range of products produced which now, using genetic modification make, it possible to apply all this know how to achieve the following. These are only a few examples. Currently, we are using genetic modification to:

- Produce new and safer vaccines.
- Treat some genetic diseases.
- Provide new and better medicines.
- Increase crop yields and decrease production costs.
- Improve food nutritional value.
- Increase livestock productivity.
- Develop biodegradable plastics.
- Decrease water and air pollution.

## II. GENETICALLY MODIFIED ORGANISMS (GMOs) IN THE FIELD

GMOs like failure tolerant sludge can help growers minimizing the loss with extreme rainfall events. Glyphosate resistant sludge and soybeans are also available. A genetically modified soybean that may lower LDL cholesterol due to the high quantum of oleic acid, all these happened because of the advancement in the biotechnology field. No doubt it's bliss. In addition to it how biotechnology is helping to make husbandry and husbandry indeed more sustainable are numerous. Like biotechnology and GM crops. In addition to it how biotechnology is helping to make husbandry and husbandry indeed more sustainable, there are numerous exemplifications – Biotechnology in Genetically Modified crops helps growers to minimize yield loss from pests and grow further food. Allows non-target insects similar as moths, butterflies, earthworms, and ladybugs to thrive, so adding biodiversity. Its operations can help in soil health and tillage reduction. It also decreases the use of dangerous diseases thereby helps to alleviate nutrient pollution.

### **III. PRODUCTION OF BIOFUELS**

Biotech companies have promoted biofuels as a safe and environmentally beneficial alternative to gasoline. It makes a substantial contribution to eliminate gaseous air pollutant. Ethanol and biodiesel are the most common biofuels. Researchers have successfully tested novel methods for producing biofuels from new sources such as rice sawdust, almond hulls, and municipal garbage. As a result, employing these biofuels will be critical in the future for sustainable growth.

### **IV. POLLUTION CONTROL BY GENETIC ENGINEERING**

In the not-too-distant future, biotech's industrial applications will evolve in such a way that it will supply the green tech tools required for industrial development that will eliminate wastes, pollution, and protect our natural resources. Genetic engineering is the most effective way to reduce pollution since it allows you to change the properties of existing degradative enzymes, tweak regulatory mechanisms, and assemble within a single organism. As a result, it is not very straightforward, but it will be quite important for population control. *Pseudomonas putida* is a well-known discovery that degrades organic solvents like toluene.

### **V. BIOPLASTICS**

One of the most important environmental issues we face today is plastic pollution. Thousands of tonnes of non-biodegradable plastic thrown every day, as well as trash from petrochemical plastic manufacturing plants, are serious environmental concerns. New plastics production processes that incorporate life could be a more environmentally friendly solution. Avantium, based in Amsterdam, is developing techniques for creating 100 percent recyclable bioplastics from agricultural and forestry waste in collaboration with large companies such as Coca-Cola and Danone. Carbios, a French company, is using microbial enzymes to break down and recycle common plastics. Other bioplastics developers include CorbionPurac and Synbra in the Netherlands, as well as Futerro in France.

### **VI. ENZYMATIC DETERGENTS**

Stronger and more long-lasting detergents were one of the early applications of industrial biotechnology. Novozymes, a Danish biotech business, introduced the first enzymatic detergents in the 1960s. They're made composed of enzymes generated from microorganisms that can break down molecules in difficult stains like blood and fat. Enzymatic detergents, unlike chemical alternatives, are biodegradable. Over time, new generations of enzymatic detergents have become more effective. They have the advantage of being able to work at lower temperatures, which saves energy. Enzymatic detergents can also be used to clean medical equipment more thoroughly and effectively than conventional cleaners.

### **VII. BIOFERTILIZERS**

All around the world, inorganic chemical fertilizer acts as main culprit of pollution. A more sustainable solution would be to replace pollution from chemical fertilizer is living microorganisms that interact with the crops to promote their development and health. A US-based startup also work with the purpose of developing microorganisms that fix nitrogen for crops such as soy and peas, avoiding the usage of conventional nitrogen fertilisers.

### **VIII. BIOPESTICIDES**

Current approaches for eradicating dangerous diseases use harsh chemicals that can harm the environment and be poisonous to humans and other living things. Biotechnology has the capability to solve this problem in more environmental friendly way that mainly depends on natural fighting skill of certain microorganism with harmful pathogens. *Willaertia magna amoeba* is being developed by Amoeba, a French company, to protect crops from fungal diseases like rust disease. The treatment is now pending European approval. In Belgium, Biotalys (previously Agrosavfe) develops proteins based on llama antibodies that target specific illnesses while causing minimal harm to other animals. Agrosustain is a Swiss biotech company that exploits compounds produced by plants to protect them from mould infestations.

**IX. CONCLUSION**

Thousands of environmental issues exist around the world, and new ones are emerging at an increasing rate. New technologies are constantly being invented, and several that have already been established are being more widely used. A technology that can harness the potential of plants and microorganisms as durable and eco-efficient agents is required in a variety of practical circumstances. Biotechnology is leading the charge and will continue to play a key role in environmental protection, food, renewable materials, and bioremediation, as well as a wide range of other technologies, to achieve sustainability goals. Environmental biotechnology is a long-term strategy for producing cost-effective methods, environmentally friendly processes, and low-impact products. The environmental and economic benefits of biotechnology in terms of production, monitoring, and waste management are counterbalanced by technological and economic difficulties that must be addressed. All of this is done with less environmental impact and greater long-term viability in mind. Governments and the biotechnology industry both benefit.

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