

Biotechnology and Bioengineering Applications- A Boon the Mankind



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Abstract

The application of biotechnology spreads across wide range of sectors. In fertilizer industry it can be used to increase crop yield, increase the fertility of animals. Also, development of hybrid clones, different of drugs and insecticides etc. can be achieved by using various biological techniques. Biological synthesis of few compounds is being explored instead of chemical synthesis due to advantages such as low activation energy and high specificity.

Keywords: Biotechnology; Bioengineering; Composting; Vermicomposting; Oxidization

Chemical and Biochemical Industry

Enzyme catalyzed reactions are an important part of biological processes. Majority of the population in India earns their livelihood by agriculture. The agriculture-based economy like India depends on rain and other natural factors. The optimum use of available resources is key to development. Many modern fertilizers and liquid fertilizers are being explored for optimum use and economy. Biotechnology plays an important role in the development of new breeds of plants and animals. The hybridization can be used to produce the new seed variety with maximum productivity. Also, various new varieties of cow can be produced by gene manipulation. The biotechnology can also be effective in pest control, insects and flies control and increasing fertility of the land. Synthesis of a compound by low cost, economical and environment friendly method is becoming a major area of research. Many chemicals and compounds like ethanol, citric acid, amino acid, lactic acid etc. are being synthesized by using biochemical pathways. Enzyme catalyzed reactions provide a highly specific, energy efficient pathway for producing many compounds. Immobilization of enzymes is added advantage with high thermal stability of enzymes. It is said that downstream processing consumes 80 percent of efforts in terms of time and money in biotechnology [1-7].

Composting, Vermicomposting

The solid waste treatment is major concern in modern civilization. Aerobic digestion methods are also frequently used for waste stabilization. Municipal solid waste consists of recyclable substances, compostable organic matter, fruit and food waste,

dust, and other inert matters. Poorly maintained transportation facilities and landfill sites poses major problem for solid waste disposal and human health. Air gets polluted due to open dumping. At least 50-55 percent municipal solid waste contains valuable resources for fertilizers and organic compounds. 35-40 percent of municipal waste is biodegradable. Vermicomposting is one of the most practiced methods for domestic and household solid waste. Vermicomposting consists of segregation of waste, precomposting, post composting and Earthworms addition.

Wastewater Treatment

Biotechnology coupled with various separation processes can handle many pollutants. There are two types of biological treatments, suspended growth and attached growth. In suspended growth processes, activated sludge processes are commonly used treatment methods. In this method, the unsaturated organic matter is saturated by oxidation. This facilitates formation of settleable sludge in many instances are then wastewater undergoes settling. Attached growth processes are mainly bio-tower and trickling bed operations. The biological slime layer is formed around the disc which revolves and passes through the waste sludge. Application of biotechnology in wastewater treatment is now extended to use of membrane bioreactors and different combined processes such as advanced oxidation, moving bed biofilm reactors etc [8-10].

Biocolours

Colours produced by chemical processing using different compounds have adverse effect on skin and are irritating. Colours

are used in food also as additive. Biocolours are produced from sustainable materials and hence are safe from health and environmental point of view.

Biosensors and medical applications

Bio nanoscience is evolving very fast to facilitate low-cost diagnosis and treatment of various diseases like cancer. Drug development and delivery is promising field with continuous research and development in the field.

Conclusion

Governments of progressive nations need to set aside sufficient fund for research and development in biotechnology. The research in biotechnology is costly and time-consuming process. However, in long term perspective this may yield the results and help in human welfare goal towards sustainable development.

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