Microorganisms to solve key environmental problems: Trends, challenges and future prospects

Forum 3

Green Technology and its applications

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Speaker 7

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Abstract

Recently, emerging applications of microbial biotechnology have demonstrated the potential to solve some of the global challenges like climate change as well as providing a source of sustainably produced feedstock for product development. The potential applications of these microbes vary from biofertilizers in agriculture to advanced methods of treatment in water wastewater technologies.

The applications of these microbial contents and processes have been found in nutraceutical, processing industry and as biofuel. However, Several barriers exist that need to be overcome to ensure that microbial biotechnology can assist with sustainable development in practice. Some of them include production optimization, cost-effective large-scale cultivation and substantial investment. The roadmap ahead should focus on these challenges as a mean to ensure a safe and sustainable future for generations to come.

Hello, I would like to welcome you all to this video presentation on World Green Science Day. I am Dr. Iftikhar, a biogeochemist, and in today's presentation, we will explore the role of microorganisms to solve key environmental problems: Trends, challenges and the way forward

Each of us shares our air, food, water and shelter with tiny colonies of microorganisms that include viruses, bacteria and fungi. We are already familiar with their role as decomposers that recycle the dead, as producers of oxygen that we breathe, as primary producers that control and feed the world, as a routine resource to treat domestic and industrial wastewater, as good microbes in and on our body to prevent us from harm such as keeping our skin healthy and as fixers of atmosphere nitrogen that is needed for building DNA, RNA, and protein molecules.

A key interlinking factor of many global issues including climate change is the use of poor practices that are not environment friendly and mismanagement of our remaining natural resources.

Recently, emerging applications of microbial biotechnology have demonstrated the potential to solve some of these challenges as well as providing a source of sustainably produced feedstock for product development. A few of these applications include:

1. Use of electric bacteria that could quadruple the speed of sewage processing. These are the bacteria that grow their own electrical wires to help them survive in harsh environments and are now helping us in transforming how we process sewage.
2. Application of bacteria that turn trees into pollution-eating machines. Hacking trees by adding bacteria to their roots to develop symbiotic relationship that could help scrub contaminated soil clean of chemicals and metals coming from industries, as a gentle remediation process.
3. Next is milking microbes for renewable energy that could help replace fossil fuels. Scientists have now found a way of producing fuel for cars from microalgae, and scaling up these techniques could create a reliable source of renewable energy.
4. Also, 'Living buildings' that could use bacteria for heat, electricity and repairs. Inserting bacteria into bricks and concrete could help designing innovative construction materials that could transform bricks into living buildings with a reduced environmental footprint.

These were just a few examples. Many of the applications of these microbes are already in practice such as biofuel production. Let's take the example of microalgae specie. Its biomass is rich in carbohydrates, proteins and lipids. In addition to these, microalgae are capable of producing a broad range of pigments, including chlorophylls, phycobili-proteins and carotenoids, and a diverse range of secondary metabolites.

Their potential applications include treating wastewater, utilization for biofuel and biogas production, use as bio fertilizers and bio stimulants in agriculture, biomass use as feed stock for fishes and apart from this, the intracellular pigments and proteins can be utilized in cosmetic, food, pharmaceutical and processing industry for diverse reasons from as a colorant, to produce bioplastic to as a resource to develop novel anticancer drug.

Although the emerging applications of microbes demonstrate the potential of these organisms to assist with the achievement of sustainable development goals. Several barriers exist that need to be overcome to ensure that microbial biotechnology can assist with sustainable development in practice. Such as production optimization, cost-effective large-scale cultivation and substantial investment. There is a dire need to come up with programs like living building challenge by living future institute to fast-track the roadmap to green sustainable practices.

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