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Environmental Biotechnology: Emergence and Acceptance for Sustainable Development

Kavita Shah*
Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi 221005, India

Editorial

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***For Correspondence**
Kavita Shah, Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi 221005, India, Tel : 0542 236 85580

E-mail: kavitashah69@gmail.com

In a medium-science, low-technology society where technology transfer, adoption, and innovations are few so as to meet a priori assigned socio-economic goals, biotechnology has come to rescue and holds promise to offer solutions to questions raised by our common developmental and environmental concerns. Where biotechnology offers the possibility of producing, from widely available renewable resources, goods and services essential to life the environmental biotechnology (EB) involves its specific application to the management of environment and related socio-economic developmental issues. Therefore, environmental biotechnology largely addresses issues of environmental monitoring, resource/residue, recovery from waste/utilization/treatment, eco-restoration, and substitution of the non-renewable resource base with alternatives/renewable resources. Sustainable development (SD) goals rest on the premise that there is a symbiotic relationship between consumers and producers as well as compatibility between ecology and economics. In addition equity and social justice, economic efficiency, ecologic harmony, human values and endogenous choices must also be satisfied to achieve the SD goals. In the face of ever-increasing population pressures and a rapidly depleting non-renewable resources, biotechnology is recognized in Agenda 21 of the Rio Summit to have a potential positive role through the mechanism of preventive environmental policy in movement of any society towards sustainable development. Human beings are both at the source and sink of any development process and therefore, it is the carrying capacity of the ecosystem that defines development and maintenance of an acceptable environment by correlating population, pollution and poverty. The role of technology in sustainable development relates to the application of resource-conserving and environmentally-sound modes of production in various socioeconomic sectors. The preventive environmental management via increased resource-use efficiency for achieving sustainable economic growth targets is the key to SD. This could be achieved through the promotion of technologies which protect the environment, cause minimal pollution, use resources in efficient and sustainable manner, recycle, reduce, reuse their wastes and products, and handle residual wastes in a more acceptable manner than the technologies they replace. Since the emergence of the environmental biotechnology field, several success stories are known that have employed EB for environmental monitoring of viruses, environmental restoration of oil spill, landfill, mining/brown fields, remediation), biosurfactants, biofuels, hydrocarbon recovery from oily sludges, desulphurization of coal and sour gases and substitution of non-renewable resources with renewables (conversion of lignocelluloses into value added chemicals). Development is a continuous and never-ending process. In view of the changing climate, increased frequency of disasters, water and food scarcity, and other emerging environmental concerns together with sustainable development, the environmental biotechnology will have to accept and address newer challenges through dissections at the finer level since any global change observed is a consequence of small and cumulative alterations brought about in the biomolecules at the cellular level. Alternate and renewable energy sources seem to be the key to a sustainable Earth.

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