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Application of Biotechnology to Mitigation of Greenhouse Warming: Proceedings of the St. Michaels Workshop, April 2003


The rapid increase in atmospheric concentrations of CO2 and other greenhouse gases (GHGs) with a global warming has increased scientific and public interest in identifying mitigation options. Two principal mitigation strategies include (i) reducing emissions or preventative measures and (ii) sequestering emissions or adaptive measures. Reducing emissions involves improving energy use efficiency and finding alternatives to fossil fuel. Sequestering emissions involves capturing and storing CO2 and sequestering it through engineering techniques and biotic options. Engineering techniques involve capturing emissions at the smokestack or tailpipe, purifying CO2, compressing it, transporting it, and then injecting it into geologic strata (old coal mines, oil wells, or saline aquifers) or the ocean. In contrast to geologic and oceanic sequestration, biotic options are based on engineering techniques, biological capture of CO2 from the atmosphere by photosynthesis in biomass, wood products, and soils, and converting biomass into fuel to offset fossil fuel. For biological sequestration to be cost-effective, there is a need for adopting a system approach involving assessment of sources and sinks at the landscape level, such that there are no adverse system functions. Being a natural process, biotic sequestration has little or no adverse ecological effects. The reaction of CO2 with water produces carbonic acid, which can be converted to calcium carbonate, so there are no adverse environmetal effects. The purpose of this 10-chapter volume is to provide an overview of biotechnology generally and for mitigation of GHGs specifically.