

Environmental Risk Assessment of Biofuels from a Perspective of Nitrogen Mass Balance

Bin-Le Lin* and Masayuki Sagisaka

Research Institute of Science for Safety and Sustainability
National Institute of Advanced Industrial Science and Technology (AIST)
16-1 Onogawa, Tukuba, Ibaraki 305-8569 Japan
Tel:+ 81-29-861-8844 Fax: +81-29-861-8904 E-mail: binle-lin@aist.go.jp

Abstract

It is absolutely essential for policy proposal for biomass utilization from a risk-based environmental impacts assessment on biofuels. Scientific controversies over its carbon neutral and its impacts on ecosystem (e.g., biodiversity loss) of biofuels produced by biomass plantation become more serious. Current environmental impacts assessments are life-cycle assessments in which mainly the impact on global warming has been targeted. However, several important direct and indirect effects on ecosystem corresponding to large scale plantation (land use changes, monoculture, and intensive agriculture), such as biodiversity loss, changing hydrology, soil erosion, ecological regime shift and etc, are usually ignored. Our research project finally attempts to develop a systemic approach for integrating all of the direct and indirect impacts to a common risk metric (ecological services) and to quantify the risks through all of the processes of biofuels from their plantation to their combustion for decision making.

Nitrogen as an essential nutrient element to launch the processes of biofuels production and an effective environmental impacts index to represent all of the direct and indirect impacts through the processes, to elucidate its pathways and mass balance and to assess its corresponding risk through the processes are assumed to be a quintessential research for the environmental risk assessment of biofuels. As the research at starting point, we will present some investigations on the capability of our previous global biogeochemical nitrogen cycle model for the purpose, and in particular, summarize the nitrogen pathways together with its impacts through processes from plantation to combustion of biofuels.

Keywords: Nitrogen, Biofuels, Risk Assessment, Ecological Service, Nitrogen Mass Balance

* Author to whom any correspondence should be addressed.