Session I Lecture 3

Mitigating Agricultural GHG Emissions and the Role of Soil Carbon Sequestration through Biochar

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Summary

Agriculture contributes 16% of global greenhouse gas emissions (GHG), with methane emissions from paddy fields accounting for approximately 10% of the total methane emissions. Rice cultivation, a key agricultural practice in the Asian monsoon region including Japan, is a major source of these emissions. To address this, NARO has developed methane reduction technologies such as extended mid-season drainage, and in 2023, Japan launched a carbon credit system for methane reduction in rice cultivation. At the same time, agriculture plays a crucial role in carbon sequestration, as crops absorb CO₂ through photosynthesis. Returning crop residues and unused biomass to the soil enhances carbon storage, and converting biomass into biochar-a stable form of carboncan further ensure long-term carbon sequestration, contributing to net-zero emissions. NARO has been researching the role of biochar in soil carbon sequestration as a negative emission technology. This presentation highlights a project under the Green Innovation Fund Program, supported by NEDO, which focuses on converting rice husks-an underutilized biomass resource-into biochar within production areas and applying it to farmland to enhance carbon sequestration. However, biochar application alone does not significantly increase yields or profits, limiting its appeal to farmers. To tackle this issue, the project aims to enhance the functionality of biochar by incorporating beneficial microorganisms to improve both productivity and environmental value to increase the economic benefits for farmers. By improving the marketability of agricultural products and integrating these innovations with policy measures, the initiative aims to establish a sustainable system that supports both agricultural productivity and climate change mitigation.