炭素貯留を実現する水処理と肥料化技術の開発（その1）

Development of water treatment and fertilizer technology to realize carbon storage (Part 1)

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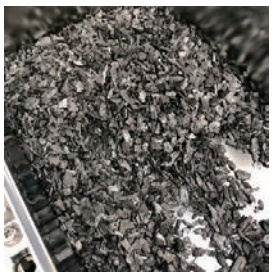

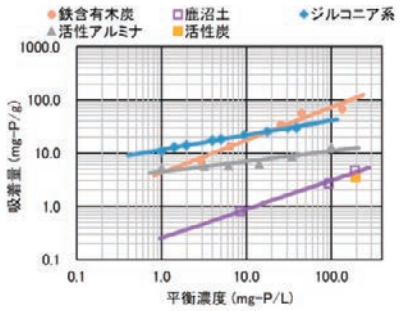

概 要

地球温暖化を1.5℃以内に抑えるためには、世界全体の人為起源CO_2排出量を2050年前後には正味ゼロに達する必要があるとされており、CDR（大気中二酸化炭素の直接除去技術）の実現が期待されている。筆者らは、大気中の二酸化炭素を取り込んだ木質を常温常圧環境下で安定な炭化物へと変換し、地中に貯留するシステムの確立に取り組んでいる。具体的には、木質を原料にガス化発電し、発電により副生する炭化物に水処理機能を付加し、水処理後の炭化物を肥料利用するカスケードシステムの確立を目指している。

本報告では、木質ガス化発電の副生炭化物から調製した鉄含有炭化物（プライムカーボン®）を対象に、リン吸着後の炭化物（リン炭）の成分分析およびコマツナを用いた植害試験を行ない、肥料特性を検討した。この結果、30 mg/L以上の平衡濃度では比較対象の全てのリン吸着材よりも高いリン吸着量を示した。また、リン炭のりん酸全量に占める可溶性リン酸の比率は48%と比較的高く、有害成分も許容値以下であった。コマツナの生長量は化成肥料よりは劣るものの、鶏糞と同程度の生長を示し、植害は認められなかった。

In order to suppress global warming to less than 1.5℃, it is said that world-wide anthropogenic CO_2 emissions need to reach net zero around 2050. CDR techniques are expected to be realized. The authors are working on the establishment of a system that converts wood that has taken in carbon dioxide from the atmosphere into stable carbon at room temperature and pressure, and stores them in the ground. Specifically, it aims to establish a cascade system that uses gasified power from wood as a raw material, adds a water treatment function to the carbon produced as a by-product of the power generation, and uses the carbonized water as a fertilizer.

In this report, iron-containing carbons (Prime Carbon®) prepared from by-product carbons of wood gasification power generation were analyzed, and component analysis of carbons after phosphorus adsorption (phosphorus charcoal) and vegetation damage tests using Komatsuna were conducted. The fertilizer characteristics were examined. As a result, at the equilibrium concentration of 30 mg/L or higher, the phosphorus adsorption amount was higher than that of all the phosphorus adsorption materials to be compared. In addition, the ratio of soluble phosphoric acid in the total amount of phosphoric acid phosphoric acid was relatively high at 48%, and harmful components were also below the allowable value. Although the growth of Komatsuna was inferior to that when using chemical fertilizer, it showed the same level of growth as chicken manure, and no plant damage was observed.