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Using Sewage Sludge as a Soil Fertility

Jambaldorj Ganchimeg (1), Mitsuru Takahashi (1), Gotou Itsuo (2), Purevsuren Sharav (3), Kunio Yoshikawa (1)

(1) Tokyo Institute of Technology, Yokohama, Japan, (2) Tokyo University of Agriculture, Tokyo, Japan, (3) Mongolian State Agricultural University, Ulaanbaatar, Mongolia

Recently due to increase of population in all nations all over the world, the sewage sludge treatment has become a serious problem. Because of appreciation of fossil fuel price and environmental pollution problem, not only proper treatment of sewage sludge but also beneficial use is under consideration.

In previous research of sewage sludge disposal by hydrothermal treatment, hydrothermal treated solid sewage sludge is used as a fuel. Because of high water content of pretreatment sewage sludge, there are problem of wastewater treatment method which are made by the process.

Therefore purpose of this research is that liquid residue made from sewage sludge by hydrothermal treatment can be used as a liquid fertilizer. Hydrothermal treatment has been investigated for promoting the beneficial use of sewage sludge. A large amount of liquid residue will be produced by this treatment at the temperature of 453-493K, because the treated sewage sludge becomes easier to be dehydrated. Therefore we are seeking for the possibility of the usage of this liquid residue as a liquid fertilizer. Three types of nutrient elements (N, P, K) and micronutrients (Cu, Zn, Mo etc) in the liquid residue have been analyzed to evaluate the feasibility of the liquid residue as a potential liquid fertilizer. The analysis results of the liquid residue showed that the weight concentration of three elements N, P, K were 9640mg/l, 33.7 mg/l, and 129mg/l, respectively. The hydrothermal treatment promotes solubilization of sewage sludge. As for the micronutrients (Cu, Zn, Mo etc), their concentrations were in the allowable range so the liquid residue is possibly to be used as a fertilizer containing micronutrients. As a result, it was shown that the liquid residue of sewage sludge

after the hydrothermal treatment has possibility of being used as a liquid fertilizer containing main nutrient elements and micronutrients.

We conducted solubilization experiment using a small autoclave facility. The N solubilization rate into liquid residue increased with increasing temperature. From this result, we can say that N which solubilized into liquid phase increased with increasing temperature. The opposite result obtained from the demonstration plant was due to the increase of steam injected with the increase of the temperature as stated above.

Now in Mongolia sewage sludge is disposed by landfill simply. Vegetables in Mongolia are mainly imported from other country that uses chemical fertilizer and agricultural chemicals. Therefore self-sufficiency ratio for vegetable falls below 20%, much less in winter. If liquid residue made from sewage sludge treated by hydrothermal can be used as a liquid fertilizer, we can grow plant efficiency in Mongolian soil, and much contribute Mongolian environment and self-sufficiency ratio.

Furthermore we carried out cultivation experiment in Mongolia due to evaluate how liquid fertilizer affects plant growth. From result of cultivation experiment used liquid residue, there is possibility that liquid residue can be used as a liquid fertilizer.

The final target of this research is that liquid residue made from sewage sludge is as effective as commercial liquid fertilizer.