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Opinion Article

Chemical Reaction of Composting in Dissolved Organic Matter and Biochar

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DESCRIPTION

Biodegradable Organic materials are transformed into a nutrient-rich soil amendment or mulch through composting, a controlled aerobic (oxygen-required) process. Compost, a material with an earthy aroma and a black, crumbly consistency, is the result. For the purpose of disposing of sludge and recycling the final product as a soil supplement or fertilizer following humification, composting is one of the most economical bioconversion procedures. Composting has currently been utilized extensively in the treatment of organic solid waste, but it has a longer maturation period and is less cost-effective due to the poor decomposition efficiency of organic matter (OM) in conventional composting technology. Therefore, it should be used for enhancing OM conversion efficiency during composting processes in order to generate more effective sludge disposal techniques. The treatment of agricultural organic wastes through composting has been proven to be successful. Additionally, some progress has been made in the study of high-quality compost. However, there is currently no perfect composting evaluation system, and there is still a vast amount of study space for quick and effective composting evaluation parameters. Both resource efficiency and by-product gas emission reduction have made significant strides. The process of humification and mineralization of organic materials is called composting. During the water solubility stage, compost undergoes biotransformation; Dissolved Organic Matter (DOM), a popular research subject for composts, can better reflect the laws of matter transformation during composting than the solid components. The DOM can therefore assess the compost ripeness immediately.

Dissolved organic matter (DOM), a common research objects of composts, can reflect transformation of matter laws during composting than do the solid components. Therefore, DOM has the possibility to quickly evaluate the compost maturity. In this study, composts made from chicken and pig manures and enriched with rice straw and cabbage were used. There are several sources of vegetable waste supplements; cabbage was chosen for this example because it is a typical source. There were 3 different kinds: 1. Pig manure and rice straw; 2. chicken manure, rice straw, and cabbage; 3. chicken manure and rice straw. The two most popular composting techniques, windrow and trough composting, were chosen for this study. By using Spectral technologies, the physical-chemical characteristics, maturity parameters, and DOM of compost were identified. Temperature, pH, moisture content, electrical conductivity (EC), and NH^{4+}-N content are physical-chemical factors. Maturity parameters include the C/N ratio, the E4/E6 ratio, and the germination index.

Due to its distinct properties, biochar is typically added as a bulking agent during the creation of compost. Biochar is a substance created through the pyrolysis of organic waste, such as rice husks. When composting, biochar seems to affect the temperature, C/N ratio, pH, and other composting factors. It also seems to have an impact on how quickly ammonia volatilizes and how quickly organic matter breaks down. Eventually, these modifications will have an impact on the variety and activity of microorganisms, which will increase the pace of carbon breakdown and cause CO_2 to accumulate. Additionally, it improves the final compost product's stability and quality. It is crucial to add biochar to compost in order to reduce greenhouse gas emissions. Additionally, biochar has a huge surface area and a porous structure, which can improve water holding capacity, nutrient adsorption, and reduce greenhouse gas emissions from agricultural farms. These benefits all come from the fact that biochar is able to sequester more carbon. Additionally, because biochar directly influences the carbon and nitrogen cycles in soil, it is able to trap methane and nitrous oxide.

CONCLUSION

As seen by the decreased NH_3 and CO_2 emissions, it has been demonstrated that adding rice husk biochar to poultry litter before composting is an efficient way to enrich the finished product. In addition to buffering the pH and controlling the temperature, adding biochar as a bulking agent throughout the composting process also decreased and mitigated CO_2 and NH_3 emission. Based on the starting amounts of compost, the results

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of the CO_2 emission trend indicate an inverse pattern. Most of the composting methods resulted in a peak of firmicutes among the treatments. Proteobacteria and Bacteroidota were also discovered in addition to Firmicutes. Unfinished composted materials can be converted into more stable forms of organic matter by the thermochemical conversion of composted olive mill pomace. Torrefied samples treated to various thermal treatments at various temperatures and for various lengths of time showed distinct features, according to final analysis and infrared spectroscopy.