

Nanocarbon Fertilizer from Organic Waste through Pyrolysis Method for Soil Fertilization and Plant Growth Enhancement

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Abstract. The amount of waste in Indonesia that continues to increase every year is a problem not only related to the volume, but also the way it is managed. Waste that is not managed properly causes pollution on land and water. According to the Ministry of Environment and Forestry, the volume of waste in Indonesia reached 68.5 million ton in 2021 and rose to 70 million ton in 2022. In addition, organic waste is a major contributor to greenhouse gas emissions if not managed properly. Food waste disposed in landfills produces methane gas emissions, which has a greater ability to trap heat in the atmosphere than carbon dioxide. Therefore, the management of organic waste, especially food waste, is very important and should be prioritized. One approach that can be taken is the production of nanocarbon fertilizer using the pyrolysis method. The pyrolysis method is a method used to obtain liquid smoke. Pyrolysis is a process of material decomposition by temperature. This process can be applied to organic waste to produce value-added products, such as nanocarbon fertilizer. Nanocarbon fertilizers contain nanometer-sized carbon particles that can increase nutrient availability and nourish plants. They also facilitate efficient nutrient uptake, improve soil fertility, have high absorption capacity, increase photosynthesis and production, lower soil toxicity, reduce application frequency, improve plant health, and reduce environmental pollution. By take account sustainability aspects and overcoming technical challenges, the development of nanocarbon fertilizers can be a significant step towards more efficient waste management and more sustainable agriculture.

Keywords: Agriculture, Pollution, Waste management