

ABSTRACT

Breadfruit peel waste (*Artocarpus altilis*) and banana peel waste (*Musa paradisiaca*) are often not utilized properly, even though both have the potential to be processed into high-value products. This study develops dual-output technology to convert this waste into biofuel and biochar through the pyrolysis process, by applying the zero emission concept to reduce environmental impacts.

The resulting biofuel can be used as a renewable energy source, while biochar functions to increase soil fertility and as an adsorbent material. The pyrolysis gas is also reused for the heating process, thereby reducing greenhouse gas emissions. This technology is in line with the principle of a circular economy, which emphasizes the reuse of resources to reduce dependence on natural raw materials.

This research is expected to be an innovative solution in waste management, increasing the efficiency of resource use, and encouraging the application of environmentally friendly technologies in the energy and agricultural sectors and supporting long-term environmental sustainability.

Keywords: Biofuel, Biochar, Pyrolysis, Breadfruit, Banana.