

***THE EFFECT OF BANANA PEEL BASED BIOETHANOL BLEND  
VARIATIONS WITH PERTALITE ON THE TORQUE AND POWER OF A  
FOUR STROKE ENGINE***

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*This study aims to analyze the effect of varying concentrations of banana peel-based bioethanol on the performance of a Honda Beat 108 cc engine, specifically torque and power output. The bioethanol was produced through hydrolysis, fermentation, and distillation processes, then blended with Pertalite fuel at concentrations of 0%, 5%, 10%, and 15%. Engine performance testing was conducted using a dynotest across engine speeds ranging from 3500 to 7500 rpm. The results show that the 5% bioethanol blend (Bpi5) provides the most optimal performance, demonstrating increased torque and power at medium to high engine speeds due to better combustion characteristics and higher oxygen content in the fuel mixture. The 10% blend (Bpi10) still offers performance close to standard fuel, though with slight reductions at lower engine speeds. In contrast, the 15% blend (Bpi15) results in significant decreases in torque and power due to higher octane levels, lower calorific value, and increased water content that negatively affects combustion. Overall, the 5% bioethanol blend is identified as the most effective composition, while higher concentrations may require engine adjustments such as compression ratio and ignition timing optimization. This research highlights the potential of utilizing banana peel waste as a renewable and environmentally friendly alternative fuel source.*

*Keywords: Banana peel bioethanol, engine performance, alternative fuel.*