

ABSTRAK

Perkembangan teknologi di bidang otomotif mendorong manusia untuk melakukan inovasi dalam meningkatkan performa kendaraan yang efisien dan ramah lingkungan. Beberapa indikator performa kendaraan meliputi *brake torque*, *brake power*, *Brake Specific Fuel Consumption* (BSFC), dan *Brake Thermal Efficiency* (BTE). Salah satu faktor krusial yang mempengaruhi performa kendaraan adalah karakteristik konsumsi bahan bakar. Hal ini mendorong pengembangan teknologi yang mampu mengoptimalkan konsumsi bahan bakar. Salah satu solusi untuk mengatasi masalah konsumsi bahan bakar dapat dilakukan dengan menambahkan zat bioaditif pada bahan bakar. Salah satu zat bioaditif yang dapat digunakan adalah minyak atsiri (*essential oils*) yang berasal dari tumbuhan. Selain itu, perilaku akselerasi berkendara juga berperan penting dalam mempengaruhi performa kendaraan. Perilaku akselerasi berkendara dikategorikan menjadi tiga, yaitu *aggressive*, *normal*, dan *slow*. Penelitian ini bertujuan untuk menguji performa kendaraan bermotor dengan rasio kompresi 12:1 akibat pengaruh perilaku akselerasi pengendara dan penambahan bioaditif kayu putih sebanyak 5% dan 10% pada bahan bakar RON 90. Penelitian ini menggunakan metode kuantitatif dengan menguji nilai *brake torque*, *brake power*, AFR, dan laju aliran massa udara terhadap kendaraan dengan rasio kompresi 12:1. Hasil penelitian menunjukkan bahwa perilaku *aggressive* dengan bioaditif 10% menghasilkan peningkatan rata – rata *brake torque* sebesar 16,20%. Peningkatan *brake power* tertinggi sebesar 21,40% terjadi pada perilaku *normal* dengan bioaditif 5%. Penurunan *Brake Specific Fuel Consumption* (BSFC) tertinggi sebesar 19,92% dihasilkan oleh perilaku *aggressive* tanpa bioaditif, sedangkan peningkatan *Brake Thermal Efficiency* (BTE) tertinggi sebesar 28,13% juga terjadi pada kondisi yang sama. Disimpulkan bahwa karakteristik perilaku berkendara serta penggunaan bioaditif kayu putih berpengaruh signifikan terhadap peningkatan performa kendaraan.

Kata Kunci: akselerasi berkendara, mesin bensin, minyak atsiri, performa kendaraan, perilaku berkendara

ABSTRACT

The development of technology in the automotive field encourages people to make innovations in improving the performance of efficient and environmentally friendly vehicles. Some vehicle performance indicators include brake torque, brake power, Brake Specific Fuel Consumption (BSFC), and Brake Thermal Efficiency (BTE). One of the crucial factors affecting vehicle performance is fuel consumption characteristics. This encourages the development of technologies that can optimize fuel consumption. One solution to overcome fuel consumption problems can be done by adding bioadditives to the fuel. One of the bioadditive substances that can be used is essential oils derived from plants. In addition, acceleration driving behavior also plays an important role in affecting vehicle performance. Acceleration driving behavior is categorized into three, namely aggressive, normal, and slow. This study aims to examine the performance of motor vehicles with a compression ratio of 12:1 due to the influence of driver acceleration behavior and the addition of eucalyptus bioadditives as much as 5% and 10% in RON 90 fuel. This study uses a quantitative method by testing the value of brake torque, brake power, AFR, and air mass flow rate for vehicles with a compression ratio of 12:1. The results showed that aggressive behavior with 10% bioadditive resulted in an average increase in brake torque of 16.20%. The highest brake power increase of 21.40% occurred in normal behavior with 5% bioadditive. The highest Brake Specific Fuel Consumption (BSFC) decrease of 19.92% was produced by aggressive behavior without bioadditives, while the highest Brake Thermal Efficiency (BTE) increase of 28.13% also occurred under the same conditions. It is concluded that the characteristics of driving behavior and the use of eucalyptus bioadditives have a significant effect on improving vehicle performance.

Keywords: driving acceleration, gasoline engine, essential oils, vehicle performance, driving behavior