

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/369130224>

Calophyllum Inophyllum (Punnai Seed oil) derived biofuel blends: Thermal performance and engine emissions

Article in *International Journal of Energy for a Clean Environment* · January 2023

DOI: 10.1615/InterJEnerCleanEnv.2023045430

CITATION

1

READS

50

4 authors, including:



Vijayananth Suyamburajan

Vels University

53 PUBLICATIONS 406 CITATIONS

SEE PROFILE

CALOPHYLLUMINOPHYLLUM (PUNNAI SEED OIL) DERIVED BIOFUEL BLENDS: THERMAL PERFORMANCE AND ENGINE EMISSIONS

Narendranathan Srinivasan Kasinathan,¹
Vijayananth Suyamburajan,² Jayaseelan Veerasundaram,³ &
Sudhakar Kumarsamy^{4,5,6,*}

¹Department of Mechanical Engineering, Agni College of Technology, Chennai, India

²Department of Mechanical Engineering, Vels Institute of Science Technology and Advanced Studies, Chennai, 600117, India

³Department of Mechanical Engineering, Prathyusha Engineering College, Chennai, 602025, India

⁴Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia

⁵Centre for Automotive Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia

⁶Energy Centre, Maulana Azad National Institute of Technology, Bhopal, Madhya Pradesh, India

*Address all correspondence to: Sudhakar Kumarsamy, Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia; Tel.: +60197308925; Fax: +609 431 5555, E-mail: sudhakar@ump.edu.my

Original Manuscript Submitted: 8/14/2022; Final Draft Received: 1/11/2023

An alternative renewable fuel resource must be identified to sustainably fulfill the expanding global energy demand. This study obtains a novel biofuel from the Punnai plant, and its physicochemical properties are evaluated against relevant standards. Conventional Diesel and Punnai oil diesel mixes are tested in an unchanged 4-stroke CI engine. As the mix ratio increases, the brake thermal efficiency decreases from 30.2% (diesel) to 26% (P40 Punnai oil diesel mix). As the percentage of blends increases, the heat-release rate decreases compared to regular diesel. The emission parameters CO, unburned HC, and smoke increase with increasing blend ratio, whereas NOx emission parameters decrease. Its natural or esterified form is suitable for a standard diesel engine. Punnai seed oil has the potential to fuel our transportation needs sustainably. Its unique energy content and ability to reduce emissions make it a promising alternative to traditional fossil fuels. With further research and development, punnai seed oil could be the driving force behind a cleaner and greener transportation future.

KEY WORDS: biofuel, combustion, emission, punnai oil, performance