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An expatiate review of neem, jatropha, rubber and karanja as multipurpose non-edible biodiesel resources and comparison of their fuel, engine and emission properties



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ABSTRACT

The demand for petroleum has risen rapidly due to increasing industrialization and modernization of the world. The limited reserve of the fossil fuels is also dwindling alongside escalation in the prices. The threats from these and food insecurity are, however, drawing the attention of researchers for alternative fuel which can be produced from renewable feedstocks. Biodiesel as the most promising alternate is currently produced from conventionally grown edible plant oils such as rapeseed, soybean, sunflower and palm. The use of the edible oils is worsening the current competition of oil for food and for fuel. Focus on the use of non-edible resources is presently directed to jatropha, mahua, pongamia, calophyllum tobacco, cotton oil, etc. Discrepancies between the expectation and realities regarding these non-edible oils are necessitating efforts for diversification of the feedstocks to resources that could guarantee energy production without affecting food security. Neem, karanja, rubber and jatropha are evergreen multipurpose non-edible plants that are widely available and can be grown in diverse socio-economic and environmental conditions. These plants are described as golden trees that have multiple uses such as for fuels, medicines, dyes, ornamentals, feeds, soil enrichment, afforestation, etc. This study was therefore undertaken to explore the multipurpose of these four non-edible tree plants. Among the highlights of this expatiate review include oil as feedstock for biodiesel, the need for non-edible feedstocks, neem, karanja, rubber, jatropha and their value chains, methods of modifying oil to biodiesel, factors affecting biodiesel production, application of the selected non-edible seed biodiesels to engines for performance and emission characteristics and the outlook.

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1. Introduction

The greater part of the world's energy is currently obtained from fossil resources such as petroleum, coal and natural gas.

These resources are currently facing dramatic dwindling making energy and fuels insecure. In the face of these, there are growing demands for energy and its security, escalation in prices of the limited fossil fuels, increased in openness to renewable energy

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