Enhancing biodiesel blend percentage by regulating fatty acid composition

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The field of biodiesel has achieved some notable developments like the efficacious catalytic advancements in the process of transesterification of the feedstocks specially the ones having higher free fatty acid content and the use of heterogeneous nanocatalysts has proved to have prominent advantages over the conventional two step acid base catalytic method for the production of Fatty Acid Methyl Ester (FAME). Various kinds of high lipid containing feedstocks have also been recognized as the source for biodiesel production and their engine performance characteristics have been studied broadly. But, still the practical use of biodiesel in diesel engines suffers various restrictions due to which only very low percentages (from 5% to 20%) of biodiesel in the blend have been brought in use till date as a transportation fuel.

Previously, few studies on the fatty acid profile of biodiesel have established their strong correlation with significant fuel properties like cetane number, oxidative stability, cold flow behavior and reduced melting point which is desired for a fuel with improved properties at low temperature.[1,2] A recent investigation has proposed that the polyunsaturated fatty acid alkyl ester, methyl linolenate, regulates the density of the biodiesel which is the key fuel property affecting the engine performance characteristics and hence can provide aid to overcome various technical limitations of the biodiesel fuel.[3] So, this paper presents an extensive study on the optimization and association of the individual fatty acid alkyl esters contained in biodiesel with the fuel properties.

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