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## Emission and Performance Analysis of Cotton Seed Oil Methyl Esters with $ZrO_2$ & $CeO_2$ Coating on Piston

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**Abstract:** The energy needs of the human society till date have been successfully fulfilled by fossil fuels such as petroleum, coal and natural gas. However, these fossil fuels are being depleted at a very high rate and this has led to the need for an alternative for these fossil fuels. Biofuels are being considered as an effective replacement for fossil fuels by researchers worldwide as they are renewable. In this study, a bio diesel having a blend of 25% cotton seed oil and 75% pure diesel is used in a Direct Injection, Kirloskar engine. The study is exhibited in three phases. In the first phase, transesterification was done to produce Cotton seed oil methyl esters with sodium hydroxide as catalyst. The second phase comprised of coating the piston with ceramic materials ( $ZrO_2$  &  $CeO_2$ ) by plasma spray process to provide a low heat rejection (LHR) engine. In the third phase, the coated engine was run at a rated speed of 1500rpm to obtain the performance and emission parameters at various loads on the engine. The results obtained were compared with i) an uncoated engine and ii) coated engine with pure diesel and cotton seed methyl esters as fuel at the same conditions.

**Keywords:** Coatings on piston, diesel engine, cotton seed methyl esters, emission and performance.

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