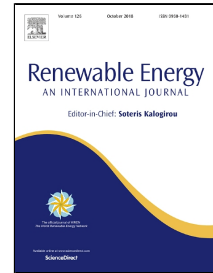


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Mitigation of carbon footprints through a blend of biofuels and oxygenates, combined with post-combustion capture system in a single cylinder CI engine

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1 **Mitigation of carbon footprints through a blend of biofuels and oxygenates,**
2 **combined with post-combustion capture system in a single cylinder CI engine**

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6 **Abstract**

7 Mitigation of carbon footprints in compression ignition (CI) engines can be achieved using
8 biofuels (carbon neutral and carbon dioxide (CO₂) sequestration effects), with oxygenates and
9 effective post-combustion capture systems. The present study focuses on the net reduction of
10 CO₂ emissions through the combination of karanja oil methyl ester (KOME), orange oil (ORG),
11 oxygenates blended fuel and zeolite-based post-combustion capture system (ZPCS) in a single
12 cylinder CI engine. KOME emitted higher CO₂ emissions as compared to the diesel. Blending
13 equal volume of ORG with KOME reduced CO₂ emissions further by 27% compared to KOME
14 but still higher compared to diesel by 11 %, at 100 % load condition. Four oxygenates, namely
15 methanol (M), ethanol (E), n-butanol (B) and n-pentanol (P) were blended 20% by volume with
16 the KOME-ORG. KOME-ORG + M20 emitted minimum CO₂ compared to other oxygenate
17 blends due to stoichiometric carbon balance, about 38 % less compared to KOME nearly
18 reaching diesel emission characteristics at 100 % load. Additionally ZPCS was placed in the
19 exhaust line and tested with all oxygenate blends with KOME-ORG, methanol blend led to 65 %
20 reduction in CO₂ emissions compared to KOME and 53 % reduction compared to diesel, at
21 100 % load .

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