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Performance Evaluation of Low Heat Rejection Diesel Engine Using Non Edible Vegetable Hemp Seed Oil

*D.RAVINDRA NAIK¹ Dr. K. SREENIVASA REDDY², Dr. B.DURGAPRASAD³

¹Associate Professor, Mechanical engg. Department, Mother Theresa Institute of Engineering and Technology, Palamaneru, Chittoor (Dt), A.P., India, E-mail: <mailto:ravindramtech@yahoo.co.in>

² Professor cum Principal, Sir Vishveshwaraiah Institute of Science & Technology, Madanapalle, Chittoor (Dt), A.P., India, E-mail: ksrmechanical@gmail.com

³ Professor & Head, Mechanical engg. Department, Jawaharlal Nehru technological University, Anantapur., A.P. India.

Abstract : The conventional sources of energy from crude oil is fast getting depleted and it is estimated that by about 2025, the conventional sources of energies will get completely exhausted and an energy crisis will occur. Further the huge demand for petroleum and diesel is aggravating the issue. This has resulted in a thrust in researchers, to explore the possibility of harvesting energy sources to meet out the expected energy crisis. Oil extracted from edible and non edible seeds mixed with diesel appears to be a possible partial solution to this energy crisis problem. However edible seeds are too expensive and non edible vegetable oils can be seriously considered as fuels for diesel engines. The auto ignition properties of these vegetable oils with straight modifications are all most similar to diesel. These oils can be used on slightly modified diesel engines. However high viscosity and low volatility of these oils are the main drawbacks for these oils to be used along with diesel in diesel engines. However slight modifications in the design of the engine, namely converting the engine in to, low heat rejection engine (LHRE) by suitably insulating piston, engine head, valves and liners along with preheating the vegetable oils to reduce the viscosity may improve the performance of the engine. If the performance of the LHRE is nearing that of pure diesel engine, it will be a significant contribution to meet out the energy crisis. Literature reported enough research work on the use of different edible and nonedible vegetable seed oils with proper blends of diesel and has resulted in a moderate improvement in the performance of the engine. The present research work is to make slight modifications in the design of the engine to convert the same in to LHRE and to preheat the non edible oils and use them as fuel with or without diesel blends in the diesel engine. Different vegetable oils were tried in the LHRE engine. An attempt is made in this paper to use hemp oil, a non edible vegetable oil as fuel with no diesel blend in the LHRE and to experimentally study the performance of this LHRE along with

conventional diesel engine without low heat rejection setup. The various parameters, which were chosen for investigations are engine brake thermal efficiency, volumetric efficiency, brake specific fuel consumption (BSFC) and the quality of exhaust which is likely to pollute the atmosphere. Various test results are noted and analysed. A comparison is made between the performance of the conventional diesel engine and the preheated hemp oil as fuel. Various conclusions are presented along with discussions wherever possible. The contribution of present work is using hemp seed oil in the LHRE diesel engine and study the various performance parameters. The major contribution of present work is that the performance of hemp oil, when used in LHRE is very close to that of normal diesel engine.

Keywords : Hemp seed oil, energy, diesel, crisis, modifications.