Analysis of Energy Requirement for Vegetable Oil Production in Northern Thailand 's Farms

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ABSTRACT

Because most energy intensive farm operations use diesel powered equipment, this has created substantial interest in vegetable oil as an alternative source of fuel for agriculture. It is, therefore, important to establish that the energy required for vegetable oil production is less than the energy content of the vegetable oil as fuel. This paper describes the evaluation of the energy output/input ratio for vegetable oil production in Northern Thailand 's small local farms. The energy ratio is defined as the ratio between energy content of fuel and total energy inputs to produce it. Vegetable oils studied in this project are from groundnut and soybean seeds. Data collection is carried out by field survey and personal interview with farmers and industrialists. The results indicated that existing oil production system produced more energy than that used as production inputs. From an energy budget view, it is therefore feasible to produce vegetable oils to use as a substitute for diesel fuel in local farms.

Key words: Energy efficiency analysis, Vegetable oils, Biofuels, Diesel substitute

INTRODUCTION

Demand for diesel fuel in Thailand is higher than the total production capacity of local refineries. Imported diesel oil accounts for about 14% of the total demand (Wilbulswas, 2002). This amounts to a large proportion in the country's energy imports. Furthermore, economic and political factors make supplies of petroleum uncertain and have given rise to tremendous price escalation. The search for alternatives to partial or total substitution of diesel fuels has, therefore, been intensified in the last few decades. Among the many different types of alternative fuels, vegetable oils and their products appear to be promising choices. Vegetable oils are gaining importance as a source of energy in Thailand, especially usage as a diesel fuel substitute. Vegetable oils are biodegradable and nontoxic, have low emission profiles, are made from renewable resources and so are environmentally beneficial (Ma and Hanna, 1999). They have been used as an alternative to the partial or total substitution of diesel fuels without requiring extensive engine adjustments or modifications and found to perform satisfactorily (Barsic and Humke, 1981; Pryde, 1983; Graboski and McCormick, 1998; Nwafor, 1999; Wilbulswas et al., 1999; Karaosmanoglu et al., 2000; Tippayawong et al., 2002). Recent concerns over the price and availability of liquid fuels have created substantial interest in vegetable oils as diesel fuel and in on-farm production method because most energy intensive operations in field crop production use diesel engines. It is therefore