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Selection of Philippine Plant Oils as Possible Feedstocks for Biodiesel

Luis F. Razon

Department of Chemical Engineering, De La Salle University, 2401 Taft Ave., 1004 Manila, Philippines
Telephone/Fax: (632)536-0257; e-mail: razonl@dlsu.edu.ph

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By using fatty acid profiles from literature, 27 plant species found in the Philippines were evaluated for their potential to provide feedstock for the production of biodiesel. Of the 27 considered, 15 plant species were found to have the potential of providing biodiesel that will conform to the biodiesel standards of the European Standard Organization (CEN) and the American Society for Testing Materials (ASTM): *Adenanthera pavonina, Calotropis gigantea, Calotropis procera, Canarium luzonicum, Canarium odontophyllum, Canarium ovatum* pulp, *Cerbera manghas, Cleome viscosa, Cryptostegia grandiflora, Dacryodes rostrata, Nephelium mutabile, Ptychosperma macarthuri, Psophocarpus tetragonolobus, Raphanus sativus* and *Sapindus saponaria.*

Key Words: biodiesel, fatty acid methyl esters, feedstock

Abbreviations: ASTM – American Society for Testing Materials; CEN – European Standards Organization

INTRODUCTION

In 1937, a patent was granted for the production of fatty acid methyl esters from vegetable and animal fats for use as fuel (Knothe 2001). Even at that time, many saw an advantage in obtaining fuel from non-petroleum sources and, indeed, biodiesel has many qualities that would make it recommendable over petroleum. It is biodegradable and non-toxic. It is known to be “carbon-neutral”, that is, it does not contribute to the greenhouse effect. When the oil comes from agricultural crops, the source is readily renewable. Many tests have shown it to be cleaner burning than petroleum-derived diesel fuels (“petrodiesel”). Compared with other alternative fuels, it offers a significant advantage – engines do not require any modifications to use a biodiesel/petrodiesel blend. Moreover, only simple infrastructure changes need to be applied when considering its distribution.

Spurred by the rising price of petroleum, the use of biodiesel continues to rise precipitously. Yet, some concerns have held back widespread replacement of petroleum. Chief among these are the concerns about cost and availability.

The primary contributor to the cost of the biodiesel is the feedstock itself, making up 60–85% of the cost of the biodiesel (Haas and Foglia 2005). Availability is an even bigger concern. In the Philippines, the primary source of biodiesel is coconut oil. In 2004, it was estimated that even if all of the coconut oil produced in the Philippines were used for biodiesel, it would constitute only a small fraction of the total demand for diesel fuel in the country (Tan et al. 2004). Because most of the other feedstocks for biodiesel are also important food ingredients, the widespread use of vegetable oils for fuel could elevate its price. Already, the European oilseed market is beginning to feel the effect of increased demand for rapeseed oil due to biodiesel production (Anonymous 2007). Hence, there is already an impetus to find alternative feedstocks for use in the manufacture of biodiesel.

The oil from *Jatropha curcas* (known in the Philippines as “tuba-tuba” or “tubang-bakod”) has been widely recommended as an alternative to the edible oils. Although good quality biodiesels have been produced from jatropha (Foidl et al. 1996; Gubitz et al. 1999), its oil, however, contains toxic components such as phorbolesters, trypsin inhibitors, phytates, saponins and lectins (Martinez-Herrera et al. 2006). These toxic components give jatropha an “advantage” in that its oil is not highly valued so that the issue of whether or not the oil should be used as food or fuel would not arise. This “advantage”, however, may be a two-