

EXTRACTION OF MAHUA (*MADHUCA INDICA*) AND VERALU (*ELAEOCARPUS SERRATUS*) OILS: A STUDY ON THEIR POTENTIAL USE IN BIODIESEL PRODUCTION

S. Kolilanathan^{1,*}, A.Manjceevan¹, S.Rasalingam²

¹Department of Physical Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka.

² Department of Chemistry, University of Jaffna, Jaffna, Sri Lanka

*kokilananthan31@gmail.com

Biodiesel, 'the mono-alkyl esters with long chain of fatty acids' derived from vegetable oils, animal fats or waste cooking oil are gaining much attention these days, since they can replace the deficiency of fossil fuel. In the present study, oils extracted from Mahua (*Madhuca Indica*) and Sri Lankan Olive (Veralu) (*Elaeocarpus serratus*) seeds by conventional hot extraction method were evaluated for the production of biodiesel. The yield percentages of oils extracted from corresponding seeds with respect to weight of used seeds kernel were found to be 30.91% and 41.91%, whereas the Free Fatty Acid (FFA) content of Mahua and Veralu oils were calculated as 19.69 mg KOH/g and 6.41 mg KOH/g, respectively. Since FFA contents of such extracts were found to be high (> 1 mg KOH/g), acid-esterification followed by alkali trans-esterification technique was used to produce biodiesel. The amount of FFA values were reduced by acid-esterification process, where concentrated sulfuric acid (1.43% v/v) and methanol (0.28 v/v methanol to oil ratio) were used as a catalyst and solvent, respectively. Reactions were performed at around 60-65 °C for 90 minutes. Then crude oils were converted into methyl esters by trans-esterification using KOH (1.4% w/w) as catalyst and methanol (0.24 w/w methanol to oil ratio) as solvent. Trans-esterification was performed at 60-65 °C for 120 minutes. Yield percentages of resultant biodiesels were calculated and several important fuel properties, like acid value, saponification value, iodine value, cetane number and density of both bio- oils and biodiesels were also determined. The values obtained were comparable with ASTM (American Society for Testing and Materials) and EN (European) biodiesel standard values, wherever applicable. In conclusion, both the oils prepared in this study are acceptable feedstock for biodiesel production, however, Veralu seed oil was found to be more efficient than Mahua oil under our experimental conditions.

Keywords: Mahua oil, Veralu oil, free fatty acid, acid-esterification, trans-esterification, Biodiesel

*Corresponding Author