

## **PALM OIL AND BIOETHANOL FOR CO<sub>2</sub> EMISSION DECREASING ON BIODIESEL PRODUCTION**

**SARKIS DE ANDRADE S. (1), SOUSA BARROS FERREIRA R. (1), CRAVO FERREIRA M. (1), DE CAMPOS GIORDANO R. (1), JOSDE ALMEIDA MEIRELLES A. (1), AUGUSTO CALDAS BATISTA E. (1), JOSMAXIMO G. (1)**

<sup>1</sup> UNICAMP, Campinas, Brazil

Soybean oil or beef tallow and methanol are the most common sources used on Brazilian biodiesel production. However, methanol, a fossil resource, is widely known by its toxicity, environmental impacts, and concern about future scarcity. Therefore, bioethanol can be an interesting alcoholic source to avoid methanol use, mainly due to market offer and renewable characteristic. Other oils could be also replaced as raw materials, to increase biodiesel production or avoid the lack of soybean oil in some regions. In this case, palm oil, can be an interesting alternative due to its high yields and low environmental impacts in Brazil, in relation to other country producers. To show the advantages of these substitutes in biodiesel production, environmental studies through life cycle assessment (LCA) are desirable. This work was aimed at evaluating the environmental impacts associated to the production of palm oil ethyl or methyl biodiesels, considering cultivation and production in Brazil compared to fossil diesel. 1 MJ of consumption was used as functional unit. Palm oil inventories from literature were entered into the SimaPro software, using the Ecoinvent3 database. The impacts categories "global warming potential" and "fossil resource scarcity" were calculated using attributional approach, mass allocation and Recipe Midpoint Hierarchist method. Results showed that, contrarily to expected, palm oil biodiesel produced by the methylic route presented lower CO<sub>2</sub> eq emissions than ethyl palm biodiesel. The production process of ethyl palm biodiesel presented CO<sub>2</sub> eq emission higher than diesel (40%) and methyl palm biodiesel (10%). However, its use in a diesel cycle engine can avoid CO<sub>2</sub> emission, calculated at 3.4 times higher than its production emission, considering a factor of 2.76 kg CO<sub>2</sub> eq. per liter. Additionally, the fossil resource scarcity impact for the methylic route is about 2 times higher than the ethylic route. Comparing to diesel, ethylic route showed a "fossil resource scarcity" 10 times lower. Ethyl palm biodiesel seems to be an attractive alternative fuel for preservation of fossil resources and to avoid global warming potential gas emissions, when compared to methyl biodiesel or diesel.