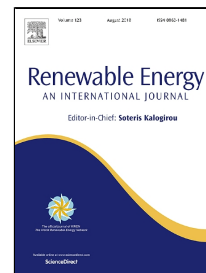


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Analysis of 22 vegetable oils' physico-chemical properties and fatty acid composition on a statistical basis, and correlation with the degree of unsaturation

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8 9 ABSTRACT

10 The aim of the current work was to gather the largest possible sample of published data
11 for vegetable oils properties, and conduct a statistical analysis in order to evaluate
12 average values for all properties and for their fatty acid composition. A second objective
13 was to investigate possible correlations between the properties and the degree of
14 unsaturation. In order to achieve both tasks, the available literature on vegetable oils
15 properties and their fatty acid composition was scanned from many well-established
16 databases. In total, 695 papers were gathered that provided 550 different data series of
17 oils properties and 536 of fatty acid composition, for 22 different oils. From the statistical
18 analysis, collective results were derived for each property and quantified based on the
19 specific oil. The effects of unsaturation were investigated too with separate best-fit linear
20 curves provided for each interesting property with respect to the average number of
21 double bonds. Unlike biodiesels, however, only a few (moderately) significant statistical
22 correlations could be established between the vegetable oils properties and the degree of
23 unsaturation, namely for cetane number, cloud and pour point and oxidation stability.

24
25 **Keywords:** Vegetable oil; Fatty acid composition; Degree of unsaturation; Statistical
26 analysis; Properties

27 1. Introduction

28 An extensive research has been carried out in the last decades regarding the use of
29 biofuels in engines, as well as the production of biofuels and alternative fuels in general.
30 This is not surprising since fuels made from agricultural products succeed in reducing the

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