Tomato seed oil: a comparison of extraction systems and solvents on its biodiesel and edible properties

A.M. Giuffrè*
C. Zappia
M. Capocasale

Università degli Studi "Mediterranea"
di Reggio Calabria (Italy)
Dipartimento di Agraria

The effects have been studied for two extraction systems: stirring and Soxhlet, and four different solvents: acetone, chloroform, ethyl acetate and petroleum ether on the physicochemical tomato seed oil properties, for an edible use and for biodiesel production. Oil yield was higher after Soxhlet-petroleum ether extraction (21.19%). Free acidity was always above 2.50%, only Soxhlet-ethyl acetate extracted a tomato seed oil with a very high free acidity (9.51%). The *p*-anisidine value was lower than 10 after both Sox and stir extractions with ethyl acetate and chloroform. Soxhlet extraction always produced the tomato seed oil with the highest Totox index. Spectrophotometric characteristics described a non-oxidized vegetable oil. Physicochemical properties for biofuel production were: density (20°C) 912.8-926.6 kg/m^3; acid value 5.44-18.93 mg KOH (g of oil)$^{-1}$; oxidative stability index 1.4-8.0 (h). The highest heating value and cetane number were always above 36 MJ (kg of oil)$^{-1}$ and 39 respectively indicated by DIN 51605 standard for a rapeseed oil for biodiesel production. Essential fatty acids were 57-58% of the total fatty acid methyl ester content. Total mono-unsaturated fatty acid, poly-unsaturated fatty acid and unsaturated fatty acid content was also calculated. The results suggest that tomato seed oil can be used as a feedstock for biodiesel production and as a food. Stirring-chloroform extraction produced the best oil for an edible use except for phenol content and 2.2-diphenyl-1-picrylhydrazyl index which were highest when ethyl acetate was used for both stirrer and Soxhlet. Stirring-chloroform and stirring petroleum ether extractions showed the best performances for biodiesel production.

Keywords biofuel, renewable energy, solvent extraction, Soxhlet, stirrer, tomato seed oil.

(*) CORRESPONDING AUTHOR:
Dr. A.M. Giuffrè
E-mail: amgiuffre@unirc.it
Phone +39 (0) 965.324077
Fax +39 (0) 965.311092