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Morphology characterization and chemical composition of UAE date seed and its potential for energy production

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This study was carried out to investigate the morphological characterization, the chemical composition and the percentage of the extracted oil of date seed powder with average size of $0.1 < DS < 0.3$ mm. The date seed powder morphology was determined by employing scanning electron microscope (SEM). The chemical composition by means of inductively coupled plasma atomic emission spectroscopy (ICP-AES), it was used for the detection of trace metals. The bomb calorimeter was used for determining the lower heating values. Thermo-Gravimetric Analyzer (TGA) by monitoring the mass losses of samples determined by pyrolysis the date seed powder samples in an inert condition. The date seeds of two types of date palm from United Arab Emirates (UAE), Khalas and Allig were considered for this study. By means of proximity analysis, the following percentage contents of Khalas date seeds powder were determined, an average for moisture, volatile protein, volatile lipids, carbohydrate and ash were varied from 7%, 40%, 23%, 13% and 17% respectively. Meanwhile, for the Allig the proximity analysis results were an average for moisture, volatile protein, volatile lipids, carbohydrate and ash were varied from 3%, 49%, 15%, 13% and 20% respectively. The ICP analysis resolved a total trace of metal components of 3.2%. The lower heating value of the Khallas and Allig powder measurements were 23 kJ/kg and 21 kJ/Kg respectively. Both date seed types exhibits an amount of oil extraction of an average of 9.5%. Based on the study finding the palm date seed with its high energy density demonstrates a promising potential as a source for energy production among other non-eatable organic product.

Biography

Emad Elnajjar is an Associate Professor in Mechanical Engineering Department at UAE University. He has earned his PhD degree in the field of Aerospace Engineering from Illinois Institute of Technology, Chicago IL, 2000. His research areas of interest are: Combustion, emission and control biofuels, system integration, energy management, renewable energy, experimental thermal fluids, micro-heat exchangers, LHP and carbon nanotubes synthesis.

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