A two-zone model based on broken and intact cells has been presented and applied to the experimental results on oil extraction obtained by various authors and on several species of seeds where the operation were based solely on solvent extraction or aided by ultrasound. The model assumes that oil contained within disrupted cells to be extracted by a solvent washing process and to be described by a convective mass transfer mechanism. Oil contained within intact cells is assumed to diffuse towards the particle surface as described by Fickean diffusion within a semi-infinite slab. The resulting model consists of algebraic equations that permit readily interpretation of experimental data in terms of relevant model parameters such as transport parameters and particle fractions of damaged and sound cells, among others. Results showed good agreement between calculated and experimental data for both conventional and ultrasound-assisted extraction. The model was found to be sensitive to the presence of ultrasound irradiation as it resulted in relatively higher convective mass-transfer rate constants and larger damaged cells proportions as compared to the corresponding conventional extraction.

Keywords
Oil extraction, model, solvent, ultrasound, mass transport parameters, cells.