

Optimization of process variable in castor oil production

Lakshmi D.K.N

Voronezh State University of Engineering Technology, Russia

Castor oil is viscous, pale yellow and non-drying oil with a bland taste and it is sometimes used as purgative. Castor oil is one of the most useful plant oils all over the world. Castor oil is used in medical, pharmaceuticals, food, and other industries for various purposes. Castor oil derivatives are used in the production of paints, varnishes, lacquers, and other protective coatings, lubricants and grease, hydraulic fluids, soaps, printing inks, linoleum etc. Its demand is increasing exponentially because of this large usage (more than 1000 applications). A scientific investigation of the crop to improve its oil yield is necessary to meet this high demand. Castor oil is derived from *Ricinus communis* L. plant seeds that contain about 50 percent oil by weight. During the process of castor oil production, these seeds must be crushed and pressed with hydraulic castor oil press. The objective of this study was to optimize castor oil recovery from castor beans using hydraulic press. The efficient and economical utilization of feed stocks is highly essential in oil producing industries which is possible only with a good model. Good modeling equation is important in the prediction and optimization of any process parameters. The present research is aimed to get a better understanding of the relation between the variables and determine the optimum conditions for the efficient recovery of castor oil with the help of an efficient model. To achieve the set goal of this study, an artificial neural network (ANN) based program coupled with genetic algorithm (GA) was developed for predicting and optimizing the process parameters of castor oil production. Experiments were designed using Central composite Design (CCD) which is an efficient statistical technique for optimization of multiple variables is applied to predict best performance conditions with minimum number of experiments and also study the characterization of castor seed oil. Based on the obtained results ANN was developed using a feed forward back propagation network. The input parameters for the ANN to generalize the pretreatment process were pressing time, Heating temperature, Moisture content and applied pressure and the output parameter was castor oil yield. The developed ANN was trained with the experimental data obtained. The well trained ANN model was able to predict the castor oil yield with MSE less than 0.06, with determinant coefficient of higher than 0.933. This ANN model was optimized by using Genetic Algorithm. The optimized process parameters predicted by the developed ANN-GA technique was experimentally verified by conducting the experiments at new set of data.

Biography

D.K.N. Lakshmi has completed his PhD at the age of 28 years from Andhra University. She got M.Ed Degree in the year 2002 and M.Sc in the year 2004. She worked as Multi Purpose Extension Officer (MPEO) in government of Andhra Pradesh for 2 years. She also served as agricultural officer for 2 year for the same government. Presently she is the director of sai agro farms. She has published more than 15 papers in reputed journals.