Development of genetic algorithm for optimization of yield models in oil palm production

ABSTRACT

For many years the Malaysian oil palm (*Elaeis guineensis* Jacq.) industry has been facing the challenge of the reduced rate of palm oil yield caused by the gap in the oil palm production and high land usage. In the oil palm industry, modelling and selecting variables play a crucial role in apprehending different issues, i.e. decision making. Nonetheless, the advance in computer technology has created a new opportunity for the study of modelling as selecting variables intended to choose the "best" subset of predictors. Owing to this great interest in the predictions, the study aims to develop a genetic algorithm (GA) to identify the relevant variables and search for the best combinations for modelling to examine the potential of oil palm production in Sarawak and Sabah, Borneo, Malaysia, under a given set of assumptions. Eleven years of high climatic change and air pollution are utilized to secure findings where the primary variable, i.e. the evaporation and surface wind speed, were recorded on the proportion of effect reached up to 100% in Sarawak and Sabah, respectively. Moreover, models were built on the basis of variables that have been selected by the GA. Across the optimization, procedures obtained the best Two Factor Interaction (2FI) models to achieve the best model of oil palm productivity prediction with a value of R^2 of 0.948, mean squared error of 0.022, and the model P-value of < 0.0001 in Sabah. This research concludes that the GA method is a user-friendly variable selection tool with excellent results because it can choose variables correctly.

Keyword: Air pollution; Climatic change; Elaeis guineensis; Sabah; Sarawak; Selection variables and sensitivity test