The Optimization of multiple responses of watermelon to organic manure using Response Surface Methodology

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Abstract

This paper discusses the use of Central Composite Design (CCD) approach to plan the experiments for growth and yield of watermelon with an overall objective of optimizes the multiple responses of watermelon to organic manure. Response Surface methodology (RSM) has been adopted to express the output parameters (responses) that are decided by the input process parameters. Poultry manure, cow manure and goat manure were the independent variables to optimize the response values of interest that includes; watermelon fruit weight, number of branches and vine length per plant. The predicted values were found to be in good agreement with the experimental values which define the propriety of the models and the achievement of CCD in the optimization of multiple responses of watermelon. The results of the study found that the optimal values of responses were 93.148 ton/Ha of fruit weight of watermelon in the study area, 8 branches of watermelon plant and vine length of 224 cm at 8weeks. Based on the findings of the study, it was recommended that farmers in the study area apply 17.125 tons/Ha of poultry manure, 13.27 tons/Ha of cow manure and 18.08 tons/Ha of goat manure for increased growth and yield of watermelon. Finally, this study represented the development of mathematical models for crop production based on statistics that can be useful for predicting and understanding the effects of experimental factors. Also, it would be a scientific and economic approach to obtain the maximum amount of information in a short period of time and with the lowest number of experiments.