

Abstract

Response Surface Methodology (RSM) is a critical technology in developing new processes, optimizing their performance and improving the design. In Kenya, watermelon cultivation is gradually gaining ground. It is a crop with huge economic importance to man as well as highly nutritious, sweet and thirst-quenching. In order to increase crop production, there is need to increase soil nutrient content with organic manure such as poultry, cow or other animal wastes. At present, there are no recommended standards with respect to rate of poultry manure, cow manure and goat manure for enhancement of yield of watermelon in Kenya. The main objective of the study was to develop an approach for better understanding of the relationship between variables and response for optimum operating settings for maximum yield of watermelon crop using Central Composite Design and Response Surface methodology. Response Surface Model evolved for response shown the effect of each input parameter and its interaction with other parameters, depicting the trend of response. Verification of the Fitness of the model using ANOVA technique shows that the model can be used with confidence level of 0.95, for watermelon production. Further validation of the model done with the additional experimental data collected demonstrates that the model have high reliability for adoption within the chosen range of parameters. The optimal value for each factor was found as 17.13tons/Ha of poultry manure, 13.3tons/Ha of cow manure and 18.1tons/Ha of goat manure. At optimal conditions, the actual value of the fruit weight of watermelon was 93.148tons/Ha. This translates to 37.3tons per acre piece of land of watermelon fruit weight for a period of 75-85 days after sowing. In addition, a peasant farmer can generate about 745,184 Kenya shillings within a period of 75 day in one acre piece of land at a low price of Kshs 20 per kilogram of watermelon fruit. RSM has resulted in saving of considerable amount of time and money hence recommended in similar study.