

Extraction Optimization for Mucilage from Okra (*Abelmoschus esculentus*) Crop by Response Surface Methodology (RSM)

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Abstract

Okra (*Abelmoschus esculentus*) is known as a vegetable with abundant mucilage content. The mucilage from natural sources has a high potential to be applied for various purposes in food, pharmaceuticals, and cosmetics formulations. The present study aimed to determine optimum conditions (amount of extraction water, amount of okra crop material, extraction temperature) for the mucilage yield extracted from the okra crop. The effect on okra mucilage yield was determined. To determine optimum conditions (amount of extraction water (150-500ml); Amount of Okra (50 –150g); Extraction temperature (60 – 100°C) for the mucilage yield extracted from the okra crop. The response surface methodology with a face centered-central composite design was applied to find the best possible combination and optimize the extraction conditions. The experimental data obtained were fitted to a second-order polynomial equation using regression analysis and analysed by appropriate statistical methods. Analysis of variance (ANOVA) showed that the contribution of the quadratic model was significant for the responses. The optimum okra mucilage extraction conditions were as follows: the amount of extraction water (325ml); the amount of okra (100g); extraction temperature (80°C) respectively. At this optimum point, the experimental okra mucilage extraction yield was found to be (11,874%), which is well in close agreement with the value predicted by the model of 10,317%. RSM was an effective tool for the optimization of okra mucilage extraction yield shown by the coefficient of determination (R^2) closer to 1 with $R^2 > 0.5$ (value of 0,87) at $p < 0.05$. The numerical optimization determined amount of extraction water and amount of okra were highly significant to the extraction potential to increase the yield, while the extraction temperature was slightly significant. The correlation between experimental and predicted values demonstrates that response surface methodology (RSM) can be a suitable optimization tool to significantly increase extraction yields of okra mucilage under certain conditions. Therefore, Response surface methodology (RSM) was used to determine optimum conditions for the mucilage yield extracted from the okra crop. The optimum conditions parameters were the amount of extraction water (325ml), amount of okra crop material (100g), and extraction temperature). This present study showed that the okra pods can be effectively extracted at low costs and can be applied as a potential ingredient for food formulations.