In order to maintain the viability of probiotic, the used of prebiotic is important. Aloe vera has been hypothesized to be a prebiotic potential for probiotic. Due to low viability of encapsulated cells, Aloe vera gel was used to be part of encapsulating matrices for probiotic, Lactobacillus acidophilus. As a result, optimization of Aloe vera gel with sodium alginate was carried out in order to determine the maximum encapsulation yield. Face centered composite design-response surface methodology (FCCD-RSM) was employed to optimize the sodium alginate concentration and Aloe vera gel (prebiotic) composition during microencapsulation process in performing a better encapsulation yield for L. acidophilus. The encapsulation yield (EY) of encapsulated L. acidophilus was investigated with respect to two variables which were sodium alginate ($X_1$) and Aloe vera gel ($X_2$). Result obtained with polynomial regression model used in this study showed highly significant (0.0013) with $R^2$ value was 0.9138. Aloe vera gel was showed highly significant ($p<0.05$) effect to the encapsulation yield. The optimum Aloe vera gel and sodium alginate were obtained at 1.12% (v/v) and 1.28% (w/v), respectively. Based on the verification process, the experimental and predicted results were showed not significant difference ($p<0.05$).

**Keyword:** Optimization; RSM; Encapsulation; Lactobacillus acidophilus; Alginate; Aloe vera gel