

## عنوان مقاله:

Optimization of Culture Condition for the Production of Menaquinone- $\gamma$  by *Bacillus Subtilis* Natto

## محل انتشار:

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## خلاصه مقاله:

Background: Vitamin K $\gamma$  refers to a series of naphthoquinone derivatives, which have a variety of physiological and pharmacological functions for the human body. The most important type of vitamin K $\gamma$  is menaquinone- $\gamma$  (MK- $\gamma$ ), an expensive raw material with no local manufacturers in Iran. Objectives: Since there was no report on the yield of MK- $\gamma$  produced by the currently available *Bacillus subtilis* natto species in Iran, this study aims to optimize the culture condition for the production of MK- $\gamma$  using this *Bacillus* species. Materials and Methods: The base medium (BM) for MK- $\gamma$  production contained glycerol (۶.۳%), soybean peptone (۳%), and yeast extract (۰.۵۱%). The selected factors for optimizing the MK- $\gamma$  production included the incubation temperature (۳۰, ۳۷, and ۴۰°C) and incubation time (۷۲, ۹۶, and ۱۲۰hr) with/without the addition of K $\gamma$ HPO $_4$  to the fermentation medium. Three sets of experiments with six modes in each set were designed based on these parameters. MK- $\gamma$  content was analyzed by the HPLC method. Results: Two experiments showed the highest MK- $\gamma$  production yields of ۰.۳۱۹ and ۰.۳۱۵۸ mg/L. The culture condition for both of these yields was as follows: ۱۲۰ hours incubation time in the presence of K $\gamma$ HPO $_4$ . However, the incubation temperature was different in these two experiments. The incubation temperature of ۳۰°C resulted in ۰.۳۱۹ mg/L MK- $\gamma$  concentration, and ۳۷°C yielded ۰.۳۱۵۸ mg/L. Conclusion: *B. subtilis* natto (IBRC-M ۱۱۱۵۳) is suitable to be used as a basic platform for the mutation and production of a high-producer species. Optimizing the culture conditions using the wild-type species is not beneficial in increasing the production ability of the bacterium. It is necessary to use different methods for enhancing the production yield of MK- $\gamma$  to lower the cost of microbial production and make the industrial

## کلمات کلیدی:

Vitamin K<sub>2</sub>, Bacillus subtilis natto, Menaquinone- $\gamma$ , fermentation

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