Research in Pharmaceutical Sciences, 2012;7(5)
School of Pharmacy and Pharmaceutical Sciences
Isfahan University of Medical Sciences

Production of vinegar by optimization of the bioreactor conditions

M. Mobasher*, N. Montazeri-Najafabady, N. Pirahmadi, S. Rasoul Amini, Y. Ghasemi

[1]Department of Pharmaceutical Biotechnology and Pharmaceutical Sciences Research Center, Faculty of Pharmacy, Shiraz University of Medical Science, Shiraz, Iran

Background and Aims: Vinegar has been in use for thousands of years and its origins are untraceable. One of the earliest references is from the 5th century bc, where Hippocrates recommended its medicinal powers. However, then as now, its main use has been in chemical and nutritional industries and as flavouring and preserving agent.
Methods: Seed culture of Gluconobacter oxydans was induced in a 10 litter stirred tank fermentor (pilot scale fermentor) connected to a computer for monitoring of pH, distilled O2 (DO), temperature, motor rounds per minute and foam formation that was equipped with an air supply system. D-glucose, glycerol, peptone, yeast extract, ethanol, oxygen and temperature were selected as raw materials. With the help of plackett- burman using Minitab 15 software, 12 experiments were designed in two levels (-1 and 1). After experiments the significant parameters on acetic acid production were defined and then the optimization was done according to 15 experiments in three levels (-1, 0, 1) designed by box-behnken using Minitab 15 software method.
Results: Three significant parameters defined by plackett- burman design, were recombined in three levels of concentrations (peptone: 0.2, 0.6, 1/ ethanol: 1, 4.5, 8/ oxygene: 10, 25, 40) in 15 experiments of box-behnken. The lowest concentration of vinegar was 1 g/ml and the highest concentration was 19 g/l.
Conclusions: The maximum production of vinegar was achieved by a medium composed of 1 g/l peptone, 45 ml/l ethanol and 10 ml/s air flow in addition of constant concentrations of D-glucose (10 g/l), glycerol (10 g/l), yeast extract (3 g/l) and temperature (30c0).

Keywords: Vinegar; Optimization; Bioreactor; Production