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Ultrasonic vibration shock treatment effects on biomass production of yeast

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Abstract

Ultrasonic vibration is one of the physical stress factor. Here stress treatment was provided to yeast cells, after that growth performance was studied. The ultrasonic vibration was given (2 MHZ) to yeast cells with different timings such as 0,2,4,6,8,10 and 12 minutes. After the treatment, Yeast were incubated to 72 hours at 37^{o}C.At the end of the experiment,optical density and biomass production of yeast were calculated. The highest OD (0.72) was observed in 2 minutes treatment .The highest biomass production also observed in 2 minutes treatment (1.044gm).The two minutes treatment produce highest growth rate compared to other treatment. If the stress time increases, the biomass production and OD value also decreased. So stress always suppress growth rate, However initially it induce growth then slowly suppress growth rate of yeast cells

Keywords. Ultrasonic vibration, Biomass production, Yeast

Introduction

In the last few decades the yeast biomass production industry has contribution many advanced approaches to traditional technological tools with a view to study the physiology, biochemistry and gene expression of yeast cells during biomass growth and processing.[1]The molecular responses of laboratory *Saccharomyces cerevisiae* strains to different stress have been thoroughly studied.[2,3].After the stress condition the growth physiology of the organism is completely altered based on the exposure of duration of stress, sometimes stress induce positive influence on growth performance, of yeast. In this study ultra-sonic vibration stress was provided to yeast cells with different timings after that growth performance was analysed.

Materials andMethods

In the present study 5ml of 24hrs yeast culture was incubated to ultra-sonic vibration ($2x10^{6}$HZ or 2 MHZ) with different time such 0, 2, 4, 6, 8,10and 12 minutes, then all the treatment were individually introduced in 3% Sterilized peptone water for biomass production. All these treatments were incubated at 37^{0}C upto72 hours. At the end of the experiment optical density (620nm) and biomass production were calculated in all the treatments.

Result and Discussion

There Eukaryotic cells have developed a special molecular mechanism to serve stressful situation, transfer information to nucleus and adapt to new conditions [3]. So in the stress conditions cells try to manage the stress and survive with the help of some other molecular mechanism. In this study low frequency ultra sonic vibration provides stress gives to yeast cells. Generally the stress alter the growth physiology [4].In this study, stress which was slowly reduced the growth rate. If increase the duration of stress, the biomass production was slowly reduced. The same trend also expressed in O.D value. The 2 minutes treatment produces highly biomass production. After this treatment the biomass production and O.D value was slowly decreased. It proves that stress initially induce growth rate after long time it suppress the growth physiology of living cells. So it is concluded that the low frequency ultrasonic vibration stress is not advisable to enhance yeast culture.

Reference

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Table: 1 Ultrasonic vibration treatment effects on Biomass production O.D value of yeast.

Treatment duration(min)	O.D value	Biomass production(mg)
0	0.70	1033
2	0.72	1044
4	0.54	1015
6	0.52	948
8	0.52	945
10	0.57	990
12	0.53	949