Bioresource Technology 118 (2012) 594–597

Contents lists available at SciVerse ScienceDirect

Bioresource Technology

journal homepage: www.elsevier.com/locate/biortech

Short Communication

Oil production on wastewaters after butanol fermentation by oleaginous yeast *Trichosporon coremiiforme*

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HIGHLIGHTS

- Oleaginous yeast *Trichosporon coremiiforme* was used for microbial oil production.
- Wastewaters after butanol fermentation were used for microbial oil production.
- COD degradation of the wastewaters by the treatment of *T. coremiiforme* was attractive.
- Biomass and lipid content of *T. coremiiforme* showed its potential for oil production.
- Lipid composition of *T. coremiiforme* showed its feasibility for biodiesel production.

ARTICLE INFO

Article history:
Received 12 March 2012
Received in revised form 1 May 2012
Accepted 6 May 2012
Available online 12 May 2012

Keywords:
Trichosporon coremiiforme
Butanol fermentation wastewaters
Microbial oil
Biodiesel

ABSTRACT

From the distillation process after butanol fermentation, wastewaters mainly consisted of organic acids and residual sugars and with high COD (usually >20,000 mg/L) are generated. Without any pretreatment and adding other nutrients (nitrogen sources and trace elements), these wastewaters were used as substrate for microbial oil production by oleaginous yeast *Trichosporon coremiiforme*. After 5 days' lipid fermentation, all the sugars and organic acids measured were totally utilized by *T. coremiiforme* and a 68% of COD degradation could be obtained. The highest biomass and lipid content of *T. coremiiforme* on the wastewaters were 5.8 g/L and 19.1%, respectively. This work shows that *T. coremiiforme* is a promising strain for microbial oil production on the wastewaters after butanol fermentation.

1. Introduction

Microbial oil, namely single cell oils (SCO), was focused in recent years not only for its important function as the supplier of valuable lipids but also its great potential as the feedstock for biodiesel production (Papanikolaou and Aggelis, 2011). However, the high cost of fermentation substrates limits its further application and industrialization. Thus, various low-cost raw materials such as industrial oils and fats (Papanikolaou and Aggelis, 2001), glycerol (Easterling et al., 2009), and lignocellulosic biomass (Huang et al., 2012) were used for microbial oil production. Besides, many works showed that oleaginous yeasts could accumulate lipid on various wastewaters such as corncob waste liquor (Venkata Subhash and Venkata Mohan, 2011), monosodium glutamate wastewaters (Xue et al., 2006), and olive oil mill wastewaters (Yousuf et al., 2010). This bioconversion process could not only solve the environmental problems of wastewaters but also reduce the cost of microbial oil production significantly.

Nowadays, liquid fuels produced by fermentation have been focused by many researchers in order to solve the problem caused by the shortage of petroleum sources. Among them, bio-butanol was considered as an attractive one since that it could be used as a gasoline additive, or even as a complete gasoline replacement. Also, it has higher energy content, lower volatility and less corrosiveness when compared with ethanol (Li et al., 2011). After butanol fermentation by different microorganisms, various products (butanol, ethanol, and acetone) in the fermentation broth could be easily recovered by distillation process. However, the remaining fermentation broth whose COD was usually higher than 20,000 mg/L needs further treatment before drainage. Different from other wastewaters, besides residual sugars, these wastewaters mainly contain different organic acids (mainly butyric acid and acetic acid).

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http://dx.doi.org/10.1016/j.biortech.2012.05.023