Title: Biotechnological conversion of spent coffee grounds into polyhydroxyalkanoates and carotenoids

Author: Stanislav Obruca Pavla Benesova Dan Kucera Sinisa Petrik Ivana Marova

PII: S1871-6784(15)00033-3
DOI: http://dx.doi.org/doi:10.1016/j.nbt.2015.02.008
Reference: NBT 763

To appear in:

Received date: 14-8-2014
Revised date: 3-2-2015
Accepted date: 14-2-2015

Please cite this article as: Obruca, S., Benesova, P., Kucera, D., Petrik, S., Marova, I.,Biotechnological conversion of spent coffee grounds into polyhydroxyalkanoates and carotenoids, *New Biotechnology* (2015), http://dx.doi.org/10.1016/j.nbt.2015.02.008

Biotechnological conversion of spent coffee grounds into polyhydroxyalkanoates and carotenoids

Stanislav Obruca[1], Pavla Benesova[1,2], Dan Kucera[2], Sinisa Petrik[1], Ivana Marova[1,2]

[1]*Materials Research Centre, Faculty of Chemistry, Brno University of Technology, Purkynova 118, 612 00 Brno, Czech Republic*

[2]*Department of Food Science and Technology, Faculty of Chemistry, Brno University of Technology, Purkynova 118, 612 00 Brno, Czech Republic*

**Corresponding author: Stanislav Obruca, Materials Research Centre, Faculty of Chemistry, Brno University of Technology, Purkynova 118, 612 00 Brno, Czech Republic. E-mail: Stana.O@seznam.cz, Tel: +420 541 149 486, Fax: +420 541 211 697*

Abstract

Coffee is one of the world´s most popular beverages and has been growing steadily in commercial importance. Nowadays, coffee is the second largest traded commodity in the world, after petroleum. Hence, coffee industry is responsible for the generation of large amounts of waste, especially spent coffee grounds (SCG). Various attempts to valorise this waste stream of coffee industry were made. This article summarizes our research and publications aiming at the conversion of SCG into valuable products – polyhydroxyalkanoates (PHAs) and carotenoids. At first, oil extracted from SCG (approx.15 wt % oil in SCG) can be efficiently ($Y_{P/S}$ = 0.82 g/g) converted into PHA employing *Cupriavidus necator* H16. Further, the solid residues after oil extraction can be hydrolysed (by the combination of chemical and enzymatic hydrolysis) yielding fermentable sugars, which can be further used as a substrate for the production of PHAs employing *Bacillus megaterium* ($Y_{P/S}$ = 0.04 g/g) or *Burkholderia cepacia* ($Y_{P/S}$ = 0.24 g/g). Alternatively, SCG hydrolysate can be used as a substrate for biotechnological production of carotenoids by carotenogenic yeast *Sporobolomyces roseus*. Solid residues after either oil extraction or hydrolysis can be used as fuel in industrial boilers