24TH Biotechnology Congress: Research & Innovations
&
Annual Congress on
CRISPR Cas9 Technology and Genetic Engineering
October 24-25, 2018 | Boston, USA

Enhanced bioH2 and poly-hydroxyalkanoates production by a co-culture of *Syntrophomonas wolfei* and a photoheterotrophic mixed consortium using a dark-fermentation effluent as substrate

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Nowadays, the pollution from oil-based derivatives such as gasoline, polyethylene, etc. is getting problematic. One possible way to overcome this issue is by developing alternative green technologies. The bio-plastics production seems to be a promising method to reduce the plastics production. Polyhydroxyalkanoates as the copolymers of PHB and PHV have similar characteristics of the polyethylenes, therefore many applications *Synthrophomonas wolfei (S. wolfei)* and some photoheterotrophic bacteria are able to produce this polymer from the effluents of organic residues treatment. Moreover, these microorganisms may produce bioH2 depending on the culture conditions. However, the production of biopolymers based on the bacteria metabolism is nowadays still more expensive than synthetic production. This condition motivates the research to optimize the biological process to make it competitive compared to the regular oil-based method. The purpose of this study was to develop the syntrophic consortium composed by *S. wolfei* and a photoheterotrophic mixed consortium named C4. This strategy would allow improving the simultaneous production of bioH2 and PHA. The dark-fermentation effluent was used as a substrate during the photoheterotrophic process. This effluent consists of a complex mixture of volatile fatty acids including acetic, butyric, lactic, propionic and some others. The data demonstrated the syntrophic activity between *S. wolfei* and C4 based on the comparison of PHA and H_2 productions from the individual and co-culture fermentations. The individual cultures showed that consortium C4 and *S. wolfei* can use the effluent as a carbon-nitrogen source. *S. wolfei* produced a higher concentration of bioH2 but lower PHA production compared with C4. The co-culture produced this bioproduct simultaneously, with 25%PHA and 90mmolv/vH2 at 100 and 75 hours respectively.The profile of volatile fatty acids consumption explained the interaction between C4 and *S. wolfei* suggesting a mutualism.

Biography

Zaira Jovana Vanegas Zuniga is a Biotechnology Engineer recently graduated from UPIBI at the National Polytechnic Institute. She is working on a research project named "Enhanced the bio-hydrogen and poly-hydroxyalkanoates production by a co-culture of *Syntrophomonas wolfei* and the photoheterotrophic mixed consortium using the dark-fermentation effluent as substrate". Her current research interests are the production of biofuels (Hydrogen and biopolymers) using residues from agro-industries as carbon-nitrogen source.

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