Efficient oleaginous yeasts for single cell oils from sugarcane molasses

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Abstract: Oleaginous yeasts, also known as oily yeasts are now considered as a potential source of lipids for biodiesel production. In terms of single cell oils production, oleaginous yeast has numerous advantages over bacteria, molds and microalgae based on their high growth rate and lipid yield. Among various types of microorganisms, oleaginous yeasts are more promising feedstock to accomplish the current demand of biodiesel production and utilize a large number of cost-effective renewable substrates for their growth and lipid accumulation. However, biodiesel obtained from oleaginous yeasts have certain restrictions regarding their commercial utilization due to their unstable fuel properties such as oxidative stability, cetane number, viscosity and low temperature performance etc. In this study, 45 yeast strains were screened to find yeast grown on 8-12% concentration of molasses agar plate. Preliminary screening by efficient oleaginous yeasts with accumulated large quantities of lipid when cultivated in molasses medium revealed that 8 strains contained lipid bodies. Molasses is a co-product of sugar production from sugar beet or sugar cane. Sugar molasses contain 23-26% water, 47-48% sugar, 9-14% minerals (Mg, Mn, Al, Fe and Zn) and 8-12% nitrogenous compounds (amino acids, proteins, etc.). The lipid production potential of 8 isolated oleaginous yeasts in molasses medium under 12% molasses concentration pH 5.5 at 30°C for 120 hours were investigated. Under these culture condition, BJMK43 produced the highest lipid concentration of 1.93 g/g biomass. The lipid content was determined as 65.48%. The main cellular fatty acids of the yeast were oleic (63.5%), palmitic acid (28.2%), Linoleic acid (19.7%) and stearic acid (10.2%). The yeast lipids seems to be a promising feedstock for biodiesel production due to a high content of C16 and C18 fatty acids. The lipids composition was found quite similar to that of vegetable oils. The study demonstrated the feasibility of simultaneous biovalorization of volatile fatty acids and glycerol, a cheap industrial by-products.

Keywords: Oleaginous yeast; Fatty acid profile; Lipids; Sugarcane molasses; Biodiesel