Biomass and phycocyanin production under heterotrophy and mixotrophy with *Galdieria sulphuraria* using xylose, glucose, and corn stover hydrolysates

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The production of cell mass, lipids, carbohydrates, proteins, and phycocyanin (PC) was evaluated with the extremophile microalgae *Galdieria sulphuraria* strain UTEX 2919, under mixotrophic (140 µmol photons/m^2 s) and heterotrophic conditions at pH 2 and 42 °C in shake flasks containing 300 mL of cultivation medium. Media used was supplemented with glucose, xylose, a mixture of both sugars, and diluted acid hemicellulosic and saccharified cellulosic hydrolysates from corn stover. A total concentration of 10 g/L of sugars was used in all experiments. Using glucose, a lower duplication time (0.50 d) and a higher cell yield (0.60 g_{DCW}/g_{Glc}) were obtained compared to xylose (0.71 d and 0.36 g_{DCW}/g_{Xyl}, respectively). Also, a higher PC accumulation was obtained in cultivations with glucose, either under mixotrophy or heterotrophy. The cell mass yield and the duplication time showed that xylose had a lower metabolic energy contribution than glucose under heterotrophy; however, this deficiency was reduced in mixotrophy. When the microalga was cultured in presence of xylose and glucose in equal amounts, the hexose catabolically repressed the pentose consumption As the hemicellulosic corn stover hydrolysates contains acetate, the microalga growth was inhibited even at very low concentrations of this organic acid (~0.5 g/L). Remarkably, *G. sulphuraria* accumulated biomass and phycocyanin heterotrophically from the glucan-enzymatic hydrolysates of the corn stover with similar proficiency compared to pure glucose.

Keywords: *Galdieria sulphuraria*, glucose and xylose, heterotrophic, mixotrophic, phycocyanin, corn stover hydrolysates.
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