CONVERSION OF CELLULOSIC BIOMASS FROM GRASS INTO FERMENTABLE SUGARS AND ITS EFFECTIVE UTILIZATION FOR BIOSYNTHESIS OF MEDIUM CHAIN LENGTH POLYHYDROXYALKANOATES (MCL-PHA) BY *PSEUDOMONAS* SPP

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The cost of polyhydroxyalkanoates (PHA) production is invariably dependent on the carbon source used. Sugars derived from cellulosic biomass offer promising low cost feedstock for bacterial growth and bioplastic production. Plant biomass, such as grass, is a sustainable source of energy which consists of mainly cellulose and hemicelluloses. In this study, cellulose generated from biomass using different pretreatment methods followed by enzymatic treatment with commercial cellulase cocktails were compared for efficient conversion into fermentable sugars. Differentially treated cellulose at 4-7% substrate loading after 24-48h resulted in 71-95% conversion into fermentable sugars. HPLC analyses of the hydrolysates showed it to contain 75-80% glucose with the remainder composed of xylose, arabinose, galactose, and mannose. We report here on the ability of various PHA accumulating strains to utilize these sugars for growth and PHA production. A comparison of growth and PHA productivity from commercially available glucose and cellulose hydrolysate revealed no significant difference in cell dry weight (CDW) and PHA composition. PHA accumulated from the cellulose hydrolysate was similar for all strains tested with 60-70 mol% of (*R*)-3 hydroxydecanoic acid monomer. HPLC analyses of the culture supernatant revealed preferential utilization of hexoses over pentose sugars by these bacterial strains

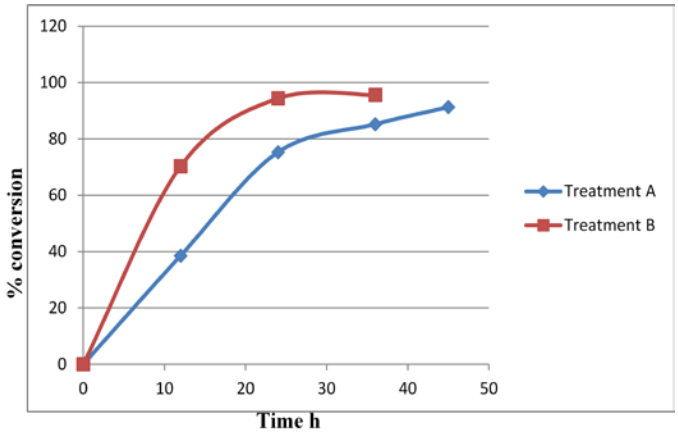

Fig. 1 Enzymatic hydrolyses of differentially treated biomass into fermentable sugars.

% conversion was calculated by estimating the sugars released at different time interval by Dinitrosalicylic acid method. Treatment A and treatment B correspond to different chemical treatment applied to the grass biomass prior to enzyme hydrolyses.