ABSTRACT

Lignocellulocis biomass is emerging to be one of the best alternatives for bioethanol production as they are renewable and also a rich source of cellulose and hemicellulose that can be converted into fermentable sugar for ethanol production. *Zymomonas mobilis* biofim is preferred over yeast and other bacteria due to its ability to tolerate the high amount of toxic substances produced during ethanol processing stages. This study aims to evaluate the biofilm forming ability on *Z. mobilis* strain TISTR 551 and ZM4 on biotic (loofah, corn silk, DEAE) and abiotic (flatted sheet polyvinyl chloride, PVC) carriers and also analyze the difference between treated and non-treated carrier for better ethanol production. Biofilm formations were visualized for 3 consecutive days under the bright-field microscope. *Z. mobilis* strain TISTR 551 represented better immobilization ability than ZM4 on all the carriers. Corn silk was well suited for cell immobilization as biofilm attachment was observed on all the different treatments; treated lignin removed one giving the highest attachment while lest on non- treated one. The mature biofilm were developed by day 3 that was quantitatively analyzed by weight differentiation of the carriers. Treated (lignin removed)/TISTR551, treated (lignin removed)/ZM4, treated (no lignin removed)/TISTR551 and treated (no lignin removed)/ZM4 after drying represented a net weight of 2.833±0.058 g, 2.533±0.058 g, 2.6±0.1 g and 2.333±0.115 g respectively, which rose from an initial weight of 2g. While no biofilm formation was observed on loofah and PVC of any strain therefore it wasn't carried to the next stage which is fermentation. Treated (lignin removed) corn silk of *Z. mobilis* TISTR551 showed better biofilm formation capacity leading to higher ethanol yield than the ZM4 strain. After 4 days of fermentation TISTR551 and ZM4 biofilm produced a theoretical yield of 107.155±24.544 % and 68.237±1.989 % respectively. That represents delignified cornsilk and *Z. mobilis* TISTR551 as a felicitous carrier-bacteria combination for bio-ethanol production in the future.