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CHARACTERIZAION OF BACTERIA FOR THEIR CELLULASE PRODUCTION

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Cellulose being a rich source of fermentable sugars could be utilized as a raw material in industries, such as bioethanol production. Although it is abundant on earth, its complex polysaccharide structure acts as a limitation, as the conversion process is costly. Microorganisms, such as bacteria and fungi, found in nature carry out cellulose hydrolysis efficiently, and could be explored for the presence of novel cellulases which may have a potential to be developed for industrial applications. The objective of the present study was to `assess some soil aerobic bacteria for their cellulase production potential. Fifteen bacteria were isolated from garden soil, decaying plant matter, plant rhizobium and the enzyme production by each isolate was compared based on two cellulose substrates *viz*; Microcrystalline and carboxy methyl cellulose. The preliminary observation of cellulose hydrolysis was done by plate culturing. The total cellulase assay was done using Whatman No 1 filter paper as substrate. Endoglucanase assay was done for broth culture extracts obtained after growing bacteria on carboxy methyl cellulose as substrate. Four bacterial isolates exhibited clear zone formation on both microcrystalline and carboxy methyl cellulose plates, indicating cellulose hydrolysis. The highest total cellulase activity (0.0409FPU/m) was given by bacterial isolate NIFS-S-8 utilizing carboxy methyl cellulose as the cellulosic substrate. The highest total cellulase activity (0.0369 FPU/ml) using microcrystalline cellulose also was given by NIFS-S-8 isolate. The highest activity for endoglucanase was observed in NIFS-S-4(1.777 U) and NIFS-S-8(1.776 U) which were not significantly different. The endoglucanases activity was significantly lower when bacteria were cultured on microcrystalline cellulose. The study identified two efficient bacteria (NIFS-S-11 and NIFS-S-8) for the production of cellulases which were more efficient in breaking down carboxy methylcellulose (amorphous cellulose) when compared to crystalline cellulose.

Keywords: Bacterial cellulose hydrolysis, Cellulose, Cellulases activity, Endoglucanases activity.