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# Screening local fungal isolates for their cellulases production: the applicability in producing bioethanol from cellulose

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Being a highly abundant, inexpensive polysaccharide present in the environment, cellulose could be used as a substrate for good bioethanol production. However, the conventional physical and chemical methods of breaking down cellulose into its monomer sugars have been costly, making it barely feasible in an industrial scale. At the same time, enzymatic hydrolysis of cellulosic material has been found to be cheaper, as well as an effective mode of cellulose degradation. Therefore, different microorganisms have been studied extensively because of their great potential to produce cellulose, which is the enzyme complex that breaks down cellulose into its simple fermentable sugar forms. The current study mainly focuses on exploring efficient, local fungal isolates for cellulase enzyme production with special reference to their ability of releasing glucose and xylose from cellulose.

Sixty five fungal strains isolated from different environments, were evaluated for their ability to produce cellulases. Enzyme production was carried out by submerged fermentation in a medium modified with Mendel's mineral salt solution with an initial pH of 5.5. The enzyme production was conducted at 30˚C with continuous shaking at 120 rpm for a period of one week. Total cellulases assay was conducted using Whatman No.1 filter paper as the substrate. The reducing sugars formed were measured colorimetrically using UV-Visible spectrophotomer at 540 nm against glucose standards. Xylanase activities were measured by modifying the Gottschalk *et al.* method. Reducing sugars formed, were measured by the same colorimetric method, using xylose standards. The highest total cellulases activity was observed in fungal isolate F1 as 0.6163 filter paper units /ml (FPU/ml), while highest xylanase activity was given by fungal isolate F3 as 14.762 (IU/ml). When the enzyme activity increased, the amount of sugar released gradually increased. According to the results, all the fungal isolates investigated showed cellulases activities above 0.01 FPU/ml. Ten isolates were categorized as best, having cellulases activity above 0.1 FPU/ml. Some isolates were very efficient in releasing xylose. Almost all the strains had xylanase activity above 0.1 IU/ml. Sixteen isolates showed xylanase activity above 9 IU/ml. According to morphological studies, fungal isolates F1 and F3 were tentatively identified to be *Trichoderma* sp. Thirteen yeast isolates were also tested for their ability to utilize glucose and xylose in order to use them in fermentation studies. All the tested isolates were capable of growing on glucose. However, only four isolates were capable of growing on xylose. These yeast isolates could be studied for co-culturing possibilities with the above glucose and xylose releasing fungal strains for bioethanol production.

**Keywords:** Cellulase activity, Microbial cellulases, *Trichoderma sp.*, Xylanase activity