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A New Biological Pretreatment Method for Enhancing Cellulase Performance

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Abstract

Introduction: Only a few bacteria capable of degrading lignin have been reported. Of these bacteria, Bacillus sp. is very useful because this soil bacterium can divide asymmetrically, producing an endospore that is resistant to environmental factors such as heat, acid, and salt for long periods of time. This manuscript suggests an effective biological pretreatment method for enhancing cellulase performance.

Materials and methods: An alkali lignin-degrading bacterium was isolated from forest soils and named CS-1. 16S rDNA sequence analysis indicated that CS-1 from Hokkaido from Okinawa was Bacillus sp. (100% identity with HQ727971.1).

Results: Strains CS-1 displayed alkali lignin degradation capability. With initial concentrations of 0.05–2.0 g l^{-1}, at least 61% alkali lignin could be degraded within 48 h. The maximum lignin-degrading rate of CS-1 was estimated to be 99.5% at a concentration of 0.05 g l^{-1}. High laccase activities were observed in crude enzyme extracts from the isolated strain. Very low (negligible) lignin peroxidase and low manganese peroxidase activities were observed. This result indicated that alkali lignin degradation was correlated with laccase activities.

Discussion: Judging from the net yields of sugars after enzymatic hydrolysis, the most effective pretreatment

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