Effects of Pretreatment of Single and Mixed Lignocellulosic Substrates on Production of Endoglucanase by *Bacillus aerius* S5.2

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A mixed substrate (MS) comprising oil palm empty fruit bunch (EFB), oil palm frond (OPF), and rice husk (RH) was evaluated for endoglucanase production by *Bacillus aerius* S5.2. Effects of sulphuric acid, sodium hydroxide, *N*-methylmorpholine-*N*-oxide (NMNO), and hydrothermal pretreatments on endoglucanase production were investigated. Endoglucanase production by *B. aerius* on the untreated (0.677 U/mL) and pretreated MS (0.305 – 0.630 U/mL) was generally similar, except that the acid (0.305 U/mL) and hydrothermal (0.549 U/mL) pretreatments that were more severe consequently produced significantly lower titres. Alkali pretreatment supported the highest enzyme production (0.630 U/mL) among all pretreatments that were studied. When endoglucanase production on the alkali-pretreated MS and single substrates (SS) was compared, alkali-pretreated EFB produced a titre (0.655 U/mL) similar to the MS, and this was significantly higher than titres recorded on OPF (0.504 U/mL) and RH (0.525 U/mL). Lower enzyme production was found to be consistent with higher pretreatment severity and greater removal of amorphous regions in all the pretreatments. Furthermore, combining the SS showed no adverse effects on endoglucanase production.

**Keywords:** *Bacillus aerius; Endoglucanase; Mixed lignocellulosic substrate; Pretreatment*

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**INTRODUCTION**

Lignocellulosic agricultural wastes such as oil palm empty fruit bunch (EFB), oil palm frond (OPF), and rice husk (RH) are generated in large amounts annually from the vibrant oil palm sector and the agricultural industry in Malaysia and other countries in the