**Mathematical Modelling of Glyphosate Degradation Rate by**

***Bacillus subtilis***

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Abstract

Glyphosate is an agricultural herbicide with usage in the amounts of thousands of tonnes per year in Malaysia. In certain soils, glyphosate can persist for months and its removal through bioremediation is the most economical and practical. A previously isolated glyphosate-degrading bacterium showed substrate inhibition to the degradation rate. Important degradation inhibition constants can be reliably obtained through nonlinear regression modelling of the degradation rate profile using substrate inhibition models such as Luong, Yano, Teissier-Edward, Aiba, Haldane, Monod and Han and Levenspiel models. The Aiba model was chosen as the best model based on statistical tests such as root-mean-square error (RMSE), adjusted coefficient of determination (adjR2), bias factor (BF) and accuracy factor (AF). The calculated values for the Aiba-Edwards constants *qmax* (the maximum specific substrate degradation rate (h−1), *Ks* (concentration of substrate at the half maximal degradation rate (mg/L) and *Ki* (inhibition constant (mg/L)) were 131±34, 4446±2073, and 24323±5094, respectively. Novel constants obtained from the modelling exercise would be useful for further secondary modelling implicating the effect of media conditions and other factors on the degradation of glyphosate by this bacterium.

Keyword: Mathematical modelling; glyphosate; glyphosate-degrading; *Bacillus subtilis*; Aiba