

Optimisation of culture composition for glyphosate degradation by *Burkholderia vietnamiensis* strain AQ5-12

ABSTRACT

The herbicide glyphosate is often used to control weeds in agricultural lands. However, despite its ability to effectively kill weeds at low cost, health problems are still reported due to its toxicity level. The removal of glyphosate from the environment is usually done by microbiological process since chemical process of degradation is ineffective due to the presence of highly stable bonds. Therefore, finding glyphosate-degrading microorganisms in the soil of interest is crucial to remediate this glyphosate. *Burkholderia vietnamiensis* strain AQ5-12 was found to have glyphosate-degrading ability. Optimisation of biodegradation condition was carried out utilising one factor at a time (OFAT) and response surface methodology (RSM). Five parameters including carbon and nitrogen source, pH, temperature and glyphosate concentration were optimised. Based on OFAT result, glyphosate degradation was observed to be optimum at fructose concentration of 6, 0.5 g/L ammonia sulphate, pH 6.5, temperature of 32 °C and glyphosate concentration at 100 ppm. Meanwhile, RSM resulted in a better degradation with 92.32% of 100 ppm glyphosate compared to OFAT. The bacterium was seen to tolerate up to 500 ppm glyphosate while increasing concentration results in reduced degradation and bacterial growth rate.

Keyword: Glyphosate; *Burkholderia vietnamiensis*; One-factor-at-time (OFAT); Response surface methodology (RSM); Bioremediation