

## Characterisation and growth kinetics studies of caffeine-degrading bacterium *Leifsonia* sp. strain SIU

### ABSTRACT

Caffeine is an important naturally occurring compound that can be degraded by bacteria. Excessive caffeine consumption is known to have some adverse effects. We isolated a new bacterium from agriculture soil. The bacterium was tested for its ability to utilise caffeine as the sole carbon and nitrogen source. The isolate was Gram-negative and was identified as *Leifsonia* sp. strain SIU based on 16S rRNA gene sequencing. It showed 97.16 % of 0.3 g/L caffeine degradation in 48 h when caffeine was used as a sole carbon and nitrogen source. The bacterial growth and degradation at 0.3 g/L caffeine concentration occurred optimally, using 5 g/L sucrose, 0.4 g/L ammonium chloride, at a temperature between 25 and 30°C and pH of 6.067.0. The Luong model best describes the kinetics of the strain growth. The values for the maximum specific growth rate ( $\mu_{max}$ ), the Monod half saturation constant ( $K_S$ ), the maximum substrate inhibitory concentration and  $n$  are 0.049 h<sup>-1</sup>, 0.0021 mg/L, 25.0 g/L and 1.562, respectively. These bacterial features make it an ultimate means for caffeine bioremediation. This is the first report of caffeine degradation by *Leifsonia* sp. strain SIU.

**Keyword:** Caffeine; Degradation; Kinetics modelling; *Leifsonia* sp.