

Bacterial degradation of caffeine: a review

ABSTRACT

Caffeine (1,3,7-trimethylxanthine) is an important naturally occurring, commercially purine alkaloid which can be degraded by bacteria. It is a stimulant central nervous system and also has negative withdrawal effects and is present in different varieties of plants such as coffee plant, tea leaves, colanut, cocoa beans and other plant. It is also present in soft drinks and is being used extensively in human consumption and has in addition some therapeutic uses but in minimal amount. Evidence has proved the harmful effects of caffeine thus opening a path in the field of caffeine biodegradation. Biodegradation by bacteria is considered to be the most efficient technique in degrading caffeine within the environment. Even though there are available methods for the removal of caffeine using conventional methods such as water, supercritical and solvent decaffeination but they are lack of accuracy/specificity for the removal of caffeine and in addition to the existing caffeine which sometime remains. Microbial degradation of caffeine provides a safe and cheaper alternative compared to chemical and physical methods. Microbial candidates for caffeine biodegradation are actively being isolated globally. Caffeine degradation can occur in both aerobically and an-aerobically depending on the contaminants. Organisms such as *Pseudomonas*, *Alcaligenes*, *Aspergillus*, *Serratia*, *Penicillium*, *Klebsiella*, *Stemphylium*, *Rhizopus*, *Rhodococcus*, *Brevibacterium*, *Bacillus* sp., and *Phanerochaete* strains have been reported to have the ability to degrade caffeine.

Keyword: Caffeine; Biodegradation; Review; Xanthine; Methylxanthine