

Reduction of hydrogen sulphide in chicken manure by immobilized sulphur oxidising bacteria isolated from hot spring

ABSTRACT

The rapid development of the poultry industry has led to the production of large amounts of manure, which produce substances like hydrogen sulfide (H₂S) that contribute to odor pollution. H₂S is a highly undesirable gas component and its removal from the environment is therefore necessary. Sulfur-oxidizing bacteria (SOB) are widely known to remove contaminating H₂S due to their ability to oxidize reduced sulfur compounds. In this study, three potential SOB (designated AH18, AH25, and AH28) that were previously isolated from a hot spring in Malaysia were identified by 16S rRNA gene analysis. Laboratory-scale biological deodorization experiments were conducted to test the performance of the three isolates—in the form of pure or mixed cultures, with the cells immobilized onto alginate as a carrier—in reducing the H₂S from chicken manure. On the basis of 16S rRNA phylogenetic analysis, isolate AH18 was identified as *Pseudomonas* sp., whereas isolates AH25 and AH28 were identified as *Achromobacter* sp. The most active deodorizing isolate was AH18, with an H₂S reduction rate of 74.7% ($p < 0.05$). Meanwhile, the reduction rates for isolates AH25 and AH28 were 54.2% and 60.8% ($p > 0.05$), respectively. However, the H₂S removal performance was enhanced in the mixed culture, with a reduction rate of 81.9% ($p < 0.05$). In conclusion, the three potential SOB isolates were capable of reducing the H₂S from chicken manure in the form of a pure culture immobilized on alginate, and the reduction performance was enhanced in the mixed culture.

Keyword: Sulphur oxidising bacteria; *Pseudomonas* sp; Hydrogen sulphide reduction; Odour removal; Poultry manure