

# Construction and evaluation of a *gfp*-tagged *Salmonella* Typhimurium strain for environmental applications<sup>#</sup>

LM Burke<sup>1</sup>, VS Brözel<sup>2</sup> and SN Venter<sup>3\*</sup>

<sup>1</sup> Division of Natural Resources and the Environment, CSIR, Pretoria 0001, South Africa

<sup>2</sup> Department of Biology and Microbiology, South Dakota State University, Brookings, SD 57007, USA

<sup>3</sup> Department of Microbiology and Plant Pathology, University of Pretoria, Pretoria 0002, South Africa

## Abstract

*Salmonella enterica* ser. Typhimurium was isolated from freshwater sediments and chromosomally labelled with a stable variant of the green fluorescent protein (GFP). The pUT mini-Tn5 Km transposon was used to introduce the *gfp* gene onto the chromosome of the *S. Typhimurium* strain by tri-parental mating. Southern Blot hybridisation confirmed that the gene had integrated into the chromosome. The *gfp* gene was stably maintained and the labelled strain was not growth-rate impaired. The incorporation of the *gfp* gene did not convey any significant loss of phenotype which would affect the survival and behaviour of the tagged strains. The tagged *S. Typhimurium* strain was used to spike an established drinking water biofilm and was able to colonise and persist within the biofilm. The tagged strain was also successfully used to study the survival of *S. Typhimurium* in natural sediments under different temperatures. These tagged strains can therefore be used to study the fate and survival of different *Salmonella* strains in water environments.

**Keywords:** biofilm, green fluorescent protein, *Salmonella* Typhimurium, survival