

## **Metal inducible activity of the oil palm metallothionein-like gene promoter (MT3-A) in prokaryotes.**

### **ABSTRACT**

Reporter gene activity under the regulation of the oil palm metallothionein-like gene, MT3-A promoter was assessed in prokaryotes. Vector constructs containing MT3-A promoter with (W1MT3-A) and without (W2MT3-A) five prime untranslated region (5'-UTR) fused to  $\beta$ -glucuronidase (GUS) gene in pCAMBIA 1304 vector were produced. 5'-rapid amplification of cDNA ends (RACE) using mRNA isolated from *Escherichia coli* and *Agrobacterium tumefaciens* harboring W1MT3-A confirmed that fusion transcripts of MT3-A 5'-UTR-GUS were successfully produced in both bacteria. Competitive PCR and GUS fluorometric assay showed changes in the level of GUS gene transcripts and enzyme activity in response to increasing concentrations of  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$ . The application of  $\text{Cu}^{2+}$  increased GUS activity and GUS mRNA level in both bacteria. In *E. coli*, a high level of GUS activity driven by W1MT3-A and W2MT3-A was observed in treatment with 25  $\mu\text{M}$   $\text{Cu}^{2+}$  resulting in an increase in the GUS mRNA level to 7.2 and 7.5  $\times 10^{-4}$  pmol/ $\mu\text{l}$  respectively, compared to the control (5.1  $\times 10^{-4}$  pmol/ $\mu\text{l}$ ). The lowest GUS activity and GUS mRNA level were obtained for W1MT3-A and W2MT3-A in the presence of 100  $\mu\text{M}$   $\text{Cu}^{2+}$  in both bacteria compared to the control (without  $\text{Cu}^{2+}$ ). The application of different  $\text{Zn}^{2+}$  concentrations resulted in a strong decrease in the GUS activity and GUS mRNA level in *E. coli* and *A. tumefaciens*. These findings showed that the oil palm MT3-A promoter is functional in prokaryotes and produced detectable GUS transcripts and enzyme activities. This promoter may potentially be used in prokaryotic systems which require metal inducible gene expression.

**Keyword:** Metallothionein-like gene promoter; *Elaeis guineensis*; *Escherichia coli*.