

## THE REGULATION OF THE ACID INDUCIBLE *LPIA* (LOW pH INDUCIBLE) GENE AND ITS IMPORTANCE IN THE ADAPTIVE ACID TOLERANCE RESPONSE OF *SINORHIZOBIUM MEDICAE* WSM419

Wan Adnawani Meor Osman<sup>1</sup>, Tian Rui<sup>1</sup>, Ravi Tiwari<sup>1</sup>, Lambert Bräu<sup>1</sup> and Wayne Reeve<sup>1</sup>  
E-mail: [adnawani@yahoo.com](mailto:adnawani@yahoo.com)

<sup>1</sup>Centre for *Rhizobium* Studies, Murdoch University, Murdoch, 6150, Western Australia.

Acid tolerance is a sought after trait in *Sinorhizobium* inoculants to enable inoculants to survive and persist in the acidic soils of South Western Australia. The acid tolerance response (ATR) of *S. medicae* has been determined to be critical for cell adaptation to lethal acid conditions and is triggered only when cells are exposed to mild acidity. The expression of the *lpiA* (low pH induced gene A) gene is critical for this response and is acid-activated at least 20-fold in mild acidic conditions (Reeve *et al.*, 1999; Reeve *et al.*, 2006). The expression of this gene is specifically induced by acidity and not by any other stress. It has previously been shown that acid-induction of *LpiA* requires functional FsrR (fused sensor-regulator). However, even in the absence of FsrR, there is still a residual 6-fold acid-induction of *LpiA* implicating other proteins in the regulation process (Reeve *et al.*, 2006). It has now been discovered that the 2 genes upstream to *lpiA*, *tcsA* (two component sensor gene A) and *tcrA* (two component regulator gene A) encode a two component signal transduction system required for full acid-inducibility. In addition, we have found that full transcription of *lpiA* requires the functional RNA polymerase sigma factor RpoN (RNA polymerase N-metabolism). Detail on the specifics of acid inducibility, the role of the regulators in ATR response and the precise role of *lpiA* in the cell will be discussed.

Reeve, W.G., Tiwari, R.P., Worsley, P.S., Dilworth, M.J., Glenn, A.R. and Howieson, J.G. (1999). Constructs for insertional mutagenesis, transcriptional signal localization and gene regulation studies in root nodule and other bacteria. *Microbiology*, 145: 1307-1316.

Reeve, W.G., Brau, L., Castelli, J., Garau, G., Sohlenkamp, C., Geiger, O., Dilworth, M.J., Glenn, A.R., Howieson, J.G. and Tiwari, R.P. (2006). The *Sinorhizobium medicae* WSM419 *lpiA* gene is transcriptionally activated by FsrR and required to enhance survival in lethal acid conditions. *Microbiology*, 152: 3049-3059.