

Evidence for a functional LuxIR-type quorum sensing circuit in *Gluconacetobacter diazotrophicus*

Rouws, L.F.M.¹; Schwab, S.¹; Hemerly, A.S.²; Baldani, J.I.¹

¹Laboratório de Genética e Bioquímica, Embrapa Agrobiologia, RJ; ²Laboratório de Biologia Molecular das Plantas, Jardim Botânico do Rio de Janeiro, RJ.

Gluconacetobacter diazotrophicus is a diazotrophic plant growth-promoting bacterium that was originally isolated from sugarcane tissues. The molecular mechanisms that are involved in the beneficial interaction with the sugarcane plant are under investigation. Analysis of the genome sequence of *G. diazotrophicus* strain PAL5 revealed the presence of three adjacent quorum sensing gene homologues: one *luxI*-type autoinducer synthesis gene and two *luxR*-type transcriptional regulators. In this study, a plasmid containing the PAL5 *luxI* promoter fused to a *lacZ* reporter gene was transferred to wild-type strain PAL5 and a derivative mutant strain containing a Tn5 insertion in the *luxI* gene. So far, in vitro experiments in polystyrene 12-well plates with solid minimal medium amended with the LacZ substrate X-gal have shown that the reporter construct is induced in the wild-type strain, but not in the mutant. In co-cultivation in a single plate-well, the wild-type was able to induce LacZ activity in the mutant strain, suggesting that a diffusible compound is involved. When glucose was used as carbon source, both the wild-type and the mutant formed dry and flat colonies. When glucose was substituted by filter-sterile sugarcane juice, mutant colonies were wet and dome-shaped, while the wild-type formed dry and flat colonies, suggesting that the *luxI* homologue has a role in a specific bacterial response to compounds present in sugarcane juice. Also, wild-type colonies stained intensely blue at the site where they entered in contact with the wall of the well, suggesting that biofilm-forming conditions may induce *luxI* promoter activity. These results indicate that the *luxI* homologue of *G. diazotrophicus* strain PAL5 is part of a LuxIR-type quorum sensing circuit.

Keywords: *Gluconacetobacter diazotrophicus*, *luxI*, quorum sensing, sugarcane juice.

Financial support: 1st author receives a FAPERJ fellowship; PRONEX/FAPERJ (process nº E-26/171.533/2006), and CNPq (process nº 552820/2007-5).