

List of Figures

Figure 1.1	Process of Nodulation in Pea and Soybean	3
Figure 1.2	Root hair cap in <i>Ensifer meliloti</i>	4
Figure 1.3	Typical quorum sensing circuit of Gram negative bacteria	20
Figure 1.4	General structure of acyl homoserine lactones	20
Figure 1.5	Scheme of quorum sensing in <i>R. leguminosarum</i> 3841	24
Figure 1.6	Quorum sensing regulatory network in <i>E. meliloti</i>	26
Figure 2.1	Screening of pigeon pea nodule isolates	45-46
Figure 2.2	Neighbour Joining trees of 16S rRNA gene sequences of selected isolates	47
Figure 2.3 (A-D)	LC/MS-MS transitions of n-Acyl homoserine lactones (AHL) detected from selected isolates and standard mixture	51-54
Figure 2.4	Semiquantitative estimations of the AHLs produced by each of the three isolates	54
Figure 2.5	Detection of QS gene homologues from the <i>Ensifer</i> isolates	56
Figure 2.6	Assessment of regulation of biofilm formation and chemotaxis phenotypes in <i>Ensifer</i> sp. HP127	57
Figure 2.7	Gene Expression analysis of symbiotically important regulatory genes from <i>Ensifer</i> sp. HP127	60
Figure 3.1	The plasmid vectors used in the Chapter 3	72
Figure 3.2	Restriction digestion patterns for confirmation of pJET- and pBBR1MCS2/5 clones of <i>cinRI</i> and <i>sinRI</i>	80
Figure 3.3	Restriction digestion patterns for confirmation of pJET- and pBBR1MCS2/5 clones of <i>cinRI</i> and <i>sinRI</i>	81

Figure 3.4 A&B	AHL production kinetics of QS overexpressing rhizobia; Photographs (A), Plot (B)	83-84
Figure 3.5	Counts of QS overexpressing rhizobia and vector controls recovered from host roots coated with	85
Figure 3.6	Effect of QS overexpression on biofilm formation	86
Figure 3.7	Exopolysaccharide production by QS overexpression strains	86
Figure 3.8	Scanning electron micrographs of Rlv3841(pCINRI) and vector control colonizing pea roots	88
Figure 3.9	Gene expression analysis of candidate genes regulating symbiotically important processes	89
Figure 3.10	Effect of inoculation of Rlv3841(pCINRI) and Em8530(pSINRI) on host growth	90
Figure 3.11	Relative competitive nodulation by QS overexpression strains as compared to the respective wildtype	91
Figure 4.1	Notation styles used in Chapter 4 to refer to different parts of the root	104
Figure 4.2	Biofilm formation and EPS production capabilities of Ensifer sp. HP127 and Ensifer sp. HP113	121
Figure 4.3	Confocal laser scanning microscopy of the Ensifer isolates on pigeon pea roots	123
Figure 4.4	Scanning electron micrographs of the Ensifer isolates on pigeon pea root	124
Figure 4.5	Time lapse imaging of alfalfa root growing in microfluidic chamber	125
