List of Figures

**Figure 1**: An outline of various management strategies against *Fusarium* infection

**Figure 2**: Comparative signal cross talk in ISR and SAR in host plant

**Figure 3**: Cellular signal specific cross talk during induction of pathogen and PGPR, a comparative analysis in local and systemic resistance in ISR and SAR

**Figure 4**: An overview of direct and indirect growth promotion mechanism induced by PGPR on host plant systems

**Figure 5**: Fluorescent colonies of the fluorescent pseudomonad isolates on King’s B agar medium observed under UV light

**Figure 6**: Number of fluorescent colonies on King’s B agar plates with varying concentration of 8-hydroxyquinoline and dilution of inoculum

**Figure 7**: Representative root growth promotion traits exerted by fluorescent pseudomonad isolates on tomato seedlings

**Figure 8**: Direct plant growth promotion traits of the 144 fluorescent pseudomonad isolates

**Figure 9**: Siderophore production of fluorescent pseudomonads. (a) Qualitative siderophore production of fluorescent pseudomonad isolates by CAS method. (b) Representative overlay of UV-visible absorbance spectrum of synthesized siderophores in presence and absence of Fe$^{3+}$

**Figure 10**: Representative *in vitro* antagonistic nature of fluorescent pseudomonad isolates against *F. oxysporum*

**Figure 11**: Indirect plant growth promotion traits of the 144 fluorescent pseudomonad isolates

**Figure 12**: Bivariate principal component analysis of shortlisted fluorescent pseudomonad isolates based on plant promoting traits, against control strains PC1 and PC2

**Figure 13**: Partial amplification of 16S rRNA of shortlisted fluorescent pseudomonads using *Pseudomonas* specific primer

**Figure 14**: Representative DNA finger printing pattern of shortlisted eleven fluorescent pseudomonads and four reference strains using RAPD primers
Figure 15: Dendrogram generated using RAPD primer analyses of fluorescent pseudomonad isolates along with four reference strains

Figure 16: Representative genomic finger printing pattern of Rep-PCR of growth promoting fluorescent pseudomonad isolates. (a) ERIC PCR (b) BOX PCR (c) REP PCR and (d) GTG₅

Figure 17: Dendrogram generated with combined genomic diversity data using ERIC, BOX, REP and GTG₅ primer analyses of fluorescent pseudomonad isolates along with four reference strains

Figure 18: Principal component analysis (PCA) based on pooled RAPD and Rep-PCR (ERIC, BOX, REP and GTG₅) profiles of fluorescent pseudomonad isolates against component 1 and 2

Figure 19: SDS-PAGE analysis of outer membrane proteins of fluorescent pseudomonads with silver nitrate staining

Figure 20: Dendrogram generated using binary data obtained with SDS-PAGE of outer membrane protein analysis of fluorescent pseudomonad isolates along with four reference strains

Figure 21: Principal component analysis based on SDS-PAGE profiles of fluorescent pseudomonad isolates against component 1 and 2

Figure 22: Comparative heat map analysis of diversity polymorphism based on number of recovered bands respect to diversity analyses

Figure 23: Representative in vitro cross-feeding plate assay for qualitative detection of N-AHL production in fluorescent pseudomonads

Figure 24: Representative chromotogram of qualitative detection of antibiotic production from shortlisted fluorescent pseudomonads based on HPLC analyses. Arrow mark indicates specific absorption at (a) 248 nm, (b) 270 nm, (c) 330 nm and (d) 367 nm in UV range detector

Figure 25: Effect of fluorescent pseudomonads in inhibition of fusarium wilt disease in tomato plants under green-house conditions

Figure 26: Representative depictions on the effect of fluorescent pseudomonads in inhibition of fusarium wilt disease in tomato plants. (a) M80 primed tomato leaves (b) M96 primed tomato leaves (c) T109 primed tomato leaves and (d) challenged control leaves
Figure 27: Scatter plot representation of correlation between disease incidence and resulted percentage disease reduction and on *Fusarium* challenge inoculation using Pearson’s correlation

Figure 28: A comparative image of deposition of lignin and callose in fungal infected leaf sample primed by M80. The representative figures are (a) lignin and (b) callose field images

Figure 29: Time dependent percentage variation of (a) H$_2$O$_2$ and (b) MDA content in leaf samples normalized to untreated control (UTC) following challenge inoculation with *F. oxysporum*

Figure 30: Time dependent percentage variation of (a) APX and (b) SOD activity in leaf samples normalized to untreated control (UTC) following challenge inoculation with *F. oxysporum*

Figure 31: Time dependent percentage variation of (a) GP and (b) PPO activity in leaf samples normalized to untreated control (UTC) in tomato following challenge inoculation with *F. oxysporum*

Figure 32: Time dependent percentage variation of (a) catalase and (b) NADH peroxidase activity in leaf samples normalized to untreated control (UTC) in tomato following challenge inoculation with *F. oxysporum*

Figure 33: Time dependent percentage variation of GR activity in leaf samples normalized to untreated control (UTC) in tomato following challenge inoculation with *F. oxysporum*.

Figure 34: Time dependent percentage variation of (a) β-1, 3 glucanase and (b) chitinase activity normalized to untreated control (UTC) in tomato leaf samples following challenge inoculation with *F. oxysporum*.

Figure 35: Time dependent percentage variation of (a) PAL activity and (b) LOX activity normalized to untreated control (UTC) in tomato leaf samples following challenge inoculation with *F. oxysporum*

Figure 36: Comparative host specific and non-specific disease incidence of fluorescent pseudomonad M80 bioformulation

Figure 37: Representative green-house pictures of formulation treatment

Figure 38: Colony count of talc formulation with respect to time of storage
List of Tables

Table 1: Fluorescent pseudomonad isolates recovered from eight individual soil rhizosphere soil samples

Table 2: Biochemical characters of shortlisted fluorescent pseudomonad isolates

Table 3: Performance wise ranking of shortlisted pseudomonads on applying statistical analysis

Table 4: Optimized PCR conditions for partial amplification of 16s rRNA using Pseudomonas specific primer

Table 5: Optimized PCR conditions for genomic diversity analysis of fluorescent pseudomonads using RAPD, ERIC, BOX, REP and GTG5 primers

Table 6: Similarity matrix generated from RAPD analysis data of shortlisted fluorescent pseudomonad isolates

Table 7: Combined similarity matrix data based on Rep-PCR (ERIC, BOX, REP and GTG5) analysis of fluorescent pseudomonad isolates

Table 8: RAPD, ERIC, BOX A1R, REP and GTG5 PCR primer sequences used in the present RAPD and Rep-PCR study and extent of polymorphism based on banding pattern obtained with fluorescent pseudomonad isolates

Table 9: Similarity matrix based on SDS-PAGE of outer membrane protein analysis of fluorescent pseudomonad isolates

Table 10: Biochemical traits pertaining to rhizosphere competence of shortlisted fluorescent pseudomonads

Table 11: In vitro production of various mycolytic enzymes and ACC deaminase by shortlisted fluorescent pseudomonad isolates

Table 12: Qualitative antibiotic production from shortlisted fluorescent pseudomonads based on HPLC

Table 13: Percentage of fusarium wilt reduction under green-house condition on priming with fluorescent pseudomonads

Table 14: Rhizosphere competence efficiency of shortlisted fluorescent pseudomonads on F. oxysporum challenge under green-house condition
Table 15: Molecular identification of best fluorescent pseudomonad isolates using partial 16S rRNA gene sequencing

Table 16: Time dependent variation in total protein, chlorophyll, phenolic and proline content in response to priming with fluorescent pseudomonads (M80, M96 and T109) against controls (UTC and CC)

Table 17: Green-house trials to study the efficiency of M80 talc formulation against host pathogen and non-host pathogen treatments

Table 18: Comparative host specific and non-specific percentage disease reduction of fluorescent pseudomonad M80 bioformulation