



Universiteit
Leiden
The Netherlands

Endophytic bacteria with plant growth promoting and biocontrol abilities

Malfanova, N.V.

Citation

Malfanova, N. V. (2013, April 10). *Endophytic bacteria with plant growth promoting and biocontrol abilities*. Retrieved from <https://hdl.handle.net/1887/20732>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/20732>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/20732> holds various files of this Leiden University dissertation.

Author: Natalia V. Malfanova

Title: Endophytic bacteria with plant growth promoting and biocontrol abilities

Issue Date: 2013-04-10

Endophytic bacteria with plant growth promoting and biocontrol abilities

Natalia V. Malfanova

Endophytic bacteria with plant growth promoting and biocontrol abilities

Proefschrift

ter verkrijgen van
de graad van Doctor aan de Universiteit Leiden,
op gezag van de Rector Magnificus prof. mr. C.J.J.M. Stolker
volgens besluit van het College voor Promoties
te verdedigen op woensdag 10 April 2013
klokke 15:00 uur

door

Natalia V. Malfanova

geboren te Staraya Russa, Rusland
in 1984

Promotie commissie

Promotor: Prof. Dr. E.J.J. Lugtenberg (Universiteit Leiden)
Overige leden: Prof. Dr. H.P. Spaik (Universiteit Leiden)
Prof. Dr. C.A.M.J.J. van den Hondel (Universiteit Leiden)
Prof. Dr. J. van Veen (Universiteit Leiden en NIOO Wageningen)
Prof. Dr. G. Berg (TU Graz)

Cover: Designed by Natalia Malfanova and Gerben Voshol

Printed by: Ridderprint BV, Ridderkerk

ISBN number: 978-90-9027408-9

Funding organization: The research described in this thesis took place as part of a Dutch - Russian Research Cooperation in the Centre of Excellence “Interaction of Plants and Beneficial Bacteria” and was subsidized by NWO/RFBR (NWO project number 047.018.001).

To *Gerben* and *Sabina*

Contents

Chapter 1.	General introduction	11
Chapter 2.	Bacterial endophytes: who and where, and what are they doing there?	15
Chapter 3.	Plant growth promotion by microbes	39
Chapter 4.	Microbial control of plant diseases	67
Chapter 5.	Characterization of <i>Bacillus subtilis</i> HC8, a novel plant-beneficial endophytic strain from giant hogweed	93
Chapter 6.	Cyclic lipopeptide profile of the plant-beneficial endophytic bacterium <i>Bacillus subtilis</i> HC8	115
Chapter 7.	Is L-arabinose important for the endophytic lifestyle of <i>Pseudomonas</i> spp.?	129
Chapter 8.	General discussion	147
Chapter 9.	Summary (in English and Dutch)	159
	Curriculum vitae	165
	Publications	166

List of abbreviations

ABA	abscisic acid
ACC	1-aminocyclopropane-1-carboxylate
AFM	antifungal metabolite
AHL	<i>N</i> -acyl homoserine lactone
AMF	arbuscular mycorrhizal fungi
BCA	biological control agent
BNF	biological nitrogen fixation
c-LP	cyclic lipopeptide
CLSM	confocal laser scanning microscopy
CNN	competition for nutrients and niches
DMDS	dimethyl disulfide
EPS	exopolysaccharide
ET	ethylene
FA	fusaric acid
FAO	food and agriculture organization
FISH	fluorescent <i>in situ</i> hybridization
Forl	<i>Fusarium oxysporum</i> f.sp. <i>radicis-lycopersici</i>
GB	gibberellin
GFP	green fluorescent protein
IAA	indole-3-acetic acid
ISR	induced systemic resistance
LC-MS	liquid chromatography mass spectrometry
LCO	lipochitooligosaccharide
LPS	lipopolysaccharide
MHB	mycorrhiza helper bacteria
P&P	predation and parasitism
PCN	phenazine-1-carboxamide
PGP	plant growth promotion
PhI	2,4-diacetyl phloroglucinol
QS	quorum sensing
ROS	reactive oxygen species
SL	strigolactone
TFRR	tomato foot and root rot

TLC	thin layer chromatography
TTSS	type three secretion system
VOC	volatile organic compound

