

**Functional Analyses of the *Bacillus velezensis* HMB26553
Genome Provide Evidence That its Genes are Potentially Related to the Promotion of Plant
Growth and Prevention of Cotton Rhizoctonia Damping-Off**

Table S1 Characterization of mobile element prophages in HMB26553 genome and plasmid

Location	Ph No.	Ph Start	Ph End	Length (bp)	CDS No.	Possible Phage	GC(%)
Chromosome	Ph01	5772	88890	83119	146	Bacillus_phage_SPBc2_NC_001884	35.5
Chromosome	Ph02	898486	946156	47671	64	Bacillus_phage_SPBc2_NC_001884	48.81
Chromosome	Ph03	1288332	1320760	32429	45	Streptococcus_phage_EJ-1_NC_005294	46.86
Chromosome	Ph04	2807911	2853628	45718	77	Listeria_phage_B054_NC_009813	43.37
Chromosome	Ph05	3110944	3187878	76935	101	Bacillus_phage_SPBc2_NC_001884	47.44

Table S2 Characterization of mobile element gene islands in HMB26553 genome and plasmid

Location	GI No.	Island Start	Island End	Length(bp)	CDS No.	GC(%)
Chromosome	GI01	2181453	2211626	30173	34	36.10
Chromosome	GI02	2808272	2828726	20454	28	42.11
Chromosome	GI03	3114033	3189050	75017	99	47.64
Chromosome	GI04	874326	945805	71479	89	48.66
plaBV1	GI05	17275	20260	2985	8	37.82

Table S3 Characterization of mobile element Crisprs in HMB26553 genome and plasmid

Location	Crisprs_ No.	Crisprs_start	Crisprs_end	DR_number	DR_Average_length	SPA_Average_length
Chromosome	CRISPR1	454669	454942	5	34	26
Chromosome	CRISPR2	754240	754886	9	45	30
Chromosome	CRISPR3	1307821	1308584	10	35	46
Chromosome	CRISPR4	1352905	1352986	2	28	26
Chromosome	CRISPR5	1355208	1355572	6	23	45
Chromosome	CRISPR6	2774436	2774797	5	32	50
Chromosome	CRISPR7	3727004	3727254	4	26	49

Table S4 The genome of GenBank accession No used in this study.

strains	GenBank accession No.	strains	GenBank accession No.
HMB26553	CP097467	<i>B. vanillea</i> XY18	GCF_000966575
<i>B. stercoris</i> D7XPN1	GCF_000738015	<i>B. methylotrophicus</i> KACC 13105	GCF_000960265
<i>B. velezensis</i> FZB42	GCF_000015785	<i>B. velezensis</i> NRRL B-41580	GCF_001461825
<i>B. subtilis</i> NCIB 3610	GCF_000186085	<i>B. nakamurai</i> NRRL B-41091	GCF_001584325
<i>B. amyloliquefaciens</i> DSM 7	GCF_000196735	<i>B. cabrialesii</i> TE3	GCF_004124315
<i>B. vallismortis</i> DV1-F-3	GCF_000245315	<i>B. rugosus</i> SPB7	GCF_011745685
<i>B. siamensis</i> KCTC 13613	GCF_000262045	<i>B. tequilensis</i> NCTC13306	GCF_900445435
<i>B. subtilis</i> ATCC 6051	GCF_006088795		

Table S5. Genes involved in the modulation of plant hormones.

Pathway	Gene	Product	Locus Tag
IAA production (L-tryptophan pathway)	<i>trpA</i>	tryptophan synthase subunit alpha TrpA	gene2390
	<i>trpB</i>	tryptophan synthase subunit beta TrpB	gene2391
	<i>trpC</i>	indole-3-glycerol phosphate synthase TrpC	gene2393
	<i>trpD</i>	anthranilate phosphoribosyltransferase	gene2394
	<i>trpE</i>	anthranilate synthase component I	gene2395
	<i>trpS</i>	Tryptophan-tRNA ligase	gene1315
IAA production IPA pathway	<i>dhaS</i>	aldehyde dehydrogenase DhaS	gene2186
	<i>dha</i>	aldehyde dehydrogenase	gene3130 gene4357
	<i>ywkB</i>	auxin efflux carrier	gene4057
ACC catabolism (ethylene)	<i>acdA</i>	acyl-CoA dehydrogenase AcdA	gene0493 gene2060 gene2564
cytokinin biosynthesis and transformation	<i>miaA</i>	(adenosine(37)-N6)-dimethylallyltransferase MiaA	gene1971
ammonia production	<i>nadE</i>	ammonia-dependent NAD(+) synthetase	gene0328

Table S6. Genes involved in iron transport and siderophore production.

Pathway	Gene	Product	Locus Tag
Iron(III) transport	<i>fbpA</i>	fur-regulated basic protein FbpA	gene1537
	<i>fetB</i>	iron export ABC transporter permease subunit FetB	gene1420
	<i>feuC</i>	Iron-uptake system permease protein FeuC	gene0202
	<i>feuB</i>	ferrichrome ABC transporter permease	gene0203
	ND	iron-uptake system-binding protein	gene0204
Iron(II) transport	<i>fecCD</i>	iron complex transport system permease protein	gene0406
	<i>fecCD</i>	iron chelate uptake ABC transporter family permease subunit	gene0407
	ND	iron ABC transporter ATP-binding protein	gene0408
	ND	iron ABC transporter substrate-binding protein	gene0409
	ND	iron-dicitrate ABC transporter substrate-binding protein	gene1219
Siderophore transport	<i>rhbE</i>	rhizobactin siderophore biosynthesis protein	gene1168
	ND	2,3-dihydroxybenzoate-AMP ligase	gene3487
	ND	2,3-dihydro-2,3-dihydroxybenzoate dehydrogenase	gene3489
	<i>yusV</i>	iron-enterobactin transporter ATP-binding protein	gene3599
	<i>yfiY</i>	iron-hydroxamate ABC transporter substrate-binding protein	gene4230

Key: ND—not determined.

Table S7. Genes involved in extracellular enzymes.

Pathway	Gene	Product	Locus Tag
protease	<i>yabG</i>	sporulation-specific protease YabG	gene0056
	<i>ftsH</i>	ATP-dependent zinc metalloprotease FtsH	gene0085
	<i>clpC</i>	ATP-dependent Clp protease ATP-binding subunit ClpC	gene0117
	<i>ydcA</i>	rhomboid family intramembrane serine protease YdcA	gene0504
	<i>ydiL</i>	CAAX prenyl protease YdiL	gene0672
	<i>ND</i>	CAAX protease	gene0787
	<i>ywpE</i>	cysteine protease YwpE	gene0822
	<i>ND</i>	serine protease	gene0910
	<i>clpB</i>	Clp protease ClpB	gene1022
	<i>yhfN</i>	metalloprotease YhfN	gene1215
	<i>ND</i>	Alkaline protease	gene1216
	<i>yjaZ</i>	Zn-dependent protease YjaZ	gene1308
	<i>xkdF</i>	phage serine protease XkdF	gene1453
	<i>ND</i>	serine protease	gene1491
	<i>ND</i>	serine protease	gene1524
	<i>htpX</i>	protease HtpX	gene1549
	<i>clpX</i>	Clp protease ClpX	gene1575
	<i>ampS</i>	thermophilic metalloprotease (M29) AmpS	gene1653
	<i>nprE</i>	neutral protease	gene1692
	<i>ylbL</i>	Lon-like protease YlbL	gene1727
	<i>ND</i>	RP-I protease	gene1752
	<i>clpQ</i>	ATP-dependent protease subunit ClpQ	gene1842
	<i>hslU</i>	ATP-dependent protease ATP-binding subunit HslU	gene1843
	<i>rseP</i>	RIP metalloprotease RseP	gene1884
	<i>ymxG</i>	zinc protease YmxG	gene1898
	<i>tepA</i>	Clp protease TepA	gene1906
	<i>ymfF</i>	metalloprotease YmfF	gene1913
	<i>ymfH</i>	zinc protease YmfH	gene1914
	<i>aprX</i>	alkaline serine protease AprX	gene1961
	<i>ctpA</i>	carboxy-terminal processing protease CtpA	gene2223
	<i>prsW</i>	protease PrsW	gene2422
	<i>yphD</i>	caax amino terminal protease	gene2429
	<i>ND</i>	sporulation factor IV B protease	gene2581
	<i>yqeZ</i>	CLP_protease YqeZ	gene2703
	<i>gpr</i>	germination protease gpr	gene2718
	<i>yrrO</i>	protease YrrO	gene2807
	<i>yrrN</i>	protease YrrN	gene2808
	<i>Prp</i>	cysteine protease Prp	gene2869
	<i>La</i>	Lon protease 1	gene2897
	<i>lonB</i>	ATP-dependent protease LonB	gene2898
	<i>clpX</i>	ATP-dependent Clp protease ATP-binding subunit ClpX	gene2899
	<i>sppA</i>	CLP_protease SppA	gene3113
	<i>yraA</i>	cysteine protease YraA	gene3138
	<i>ND</i>	ATP-dependent Clp protease proteolytic subunit	gene3322
	<i>pfpI</i>	protease PfpI	gene3401
	<i>yugP</i>	neutral zinc metalloproteinase YugP	gene3413
	<i>htrB</i>	serine protease HtrB	gene3604
	<i>ND</i>	reprolysin (M12B) family zinc metalloprotease	gene3662
	<i>clpP</i>	ATP-dependent Clp protease proteolytic subunit clpP	gene3782
	<i>minJ</i>	serine protease MinJ	gene3853
	<i>ctpB</i>	carboxy-terminal processing protease CtpB	gene3855
	<i>ywhC</i>	zinc metalloprotease YwhC	gene4103

	<i>vpr</i>	minor extracellular protease vpr	gene4172
	<i>yjfC</i>	Zn-dependent protease YjfC	gene4200
	<i>epr</i>	minor extracellular protease Epr	gene4204
	<i>htpX</i>	protease HtpX	gene4364
	<i>yyx.A</i>	serine protease	gene4405
	<i>epr</i>	minor extracellular protease Epr	gene4456
	<i>yyaK</i>	caax amino terminal protease	gene4462
	<i>yyaC</i>	spore protease YyaC	gene4477
			gene0301
			gene0320
amylase	<i>amyA</i>	alpha-glucosidase	gene3411
			gene3784
			gene3790
	<i>ND</i>	alpha-phosphotrehalase	gene0843
	<i>ND</i>	arabinogalactan endo-1,4-beta-galactosidase	gene1397
	<i>ND</i>	endo-1,4-beta-glucanase	gene2091
	<i>bglC</i>	aryl-phospho-beta-D-glucosidase BglC	gene0354
	<i>bglA</i>	aryl-phospho-beta-D-glucosidase BglA	gene2221
cellulase	<i>ND</i>	6-phospho-beta-galactosidase	gene1403
	<i>ND</i>	glycosyl hydrolase	gene2219
	<i>celF</i>	6-phospho-beta-glucosidase CelF	gene4220
	<i>bglA</i>	6-phospho-beta-glucosidase BglA	gene4236

Table S8. Genes involved in motility.

Pathway	Gene	Product	Locus Tag
	<i>swrC</i>	swarming motility protein SwrC	gene0745
	<i>pilT</i>	twitching motility protein PilT	gene0749
	<i>yjfB</i>	putative motility protein YjfB	gene1411
	<i>motB</i>	flagellar motor protein MotB	gene1572
	<i>motA</i>	flagellar motor protein MotA	gene1573
	<i>flgB</i>	flagellar biosynthesis protein FlgB	gene1845
	<i>flgC</i>	flagellar basal body rod protein FlgC	gene1846
	<i>fliE</i>	flagellar hook-basal body complex protein FliE	gene1847
	<i>fliF</i>	flagellar M-ring protein FliF	gene1848
	<i>fliG</i>	flagellar motor switch protein FliG	gene1849
	<i>fliH</i>	flagellar assembly protein FliH	gene1850
	<i>ND</i>	Flagellum-specific ATP synthase	gene1851
	<i>fliJ</i>	flagellar biosynthesis chaperone FliJ	gene1852
	<i>fliK</i>	flagellar hook-length control protein FliK	gene1854
	<i>flgD</i>	flagellar basal body rod modification protein FlgD	gene1855
Motility	<i>flgG</i>	flagellar basal body rod protein FlgG	gene1856
	<i>fliL</i>	flagellar basal body-associated protein FliL	gene1858
	<i>fliM</i>	flagellar motor switch protein FliM	gene1859
	<i>fliY</i>	flagellar motor switch phosphatase FliY	gene1860
	<i>fliZ</i>	flagellar biosynthesis protein FliZ	gene1862
	<i>fliP</i>	flagellar biosynthetic protein FliP	gene1863
	<i>fliQ</i>	flagellar export apparatus protein FliQ	gene1864
	<i>fliR</i>	flagellar biosynthesis protein FliR	gene1865
	<i>flhB</i>	flagellar biosynthesis protein FlhB	gene1865
	<i>flhA</i>	flagellar biosynthesis protein FlhA	gene1867
	<i>flhF</i>	flagellar biosynthesis regulator FlhF	gene1868
	<i>swrB</i>	swarming motility protein SwrB	gene1876
	<i>ypfA</i>	increasing levels of c-di-GMP lead to decreased motility YpfA	gene2419
	<i>swrAA</i>	swarming motility protein SwrAA	gene3854
	<i>fliT</i>	flagellar protein FliT	gene3865

<i>fliS</i>	flagellar protein FliS	gene3866
<i>fliD</i>	flagellar hook-associated protein	gene3867
<i>fliC</i>	Flagellin fliC	gene3868
<i>fliW</i>	flagellar assembly protein FliW	gene3870
<i>flgL</i>	flagellar hook-associated protein FlgL	gene3872
<i>flgK</i>	flagellar hook-associated protein FlgK	gene3873
<i>flgN</i>	flagellar protein FlgN	gene3874
<i>flgM</i>	flagellar biosynthesis anti-sigma factor FlgM	gene3875
<i>flhP</i>	flagellar hook-basal body protein FlhP	gene3985
<i>flhO</i>	flagellar basal body rod protein subunit C	gene3986

Table S9. Genes involved in biofilm formation.

Pathway	Gene	Product	Locus Tag
Biofilm formation	<i>efp</i>	elongation Factor P	gene2604
	<i>tasA</i>	camelysin metallo-endopeptidase tasA	gene2620
	<i>hfq</i>	RNA chaperone Hfq	gene1972
	<i>crp</i>	Crp/Fnr family transcriptional regulator	gene1522
			gene4085
	<i>wzd</i>	Auxiliary protein for polysaccharide export and chain length determination	gene3972
	<i>wze</i>	Autophosphorylating tyrosine-protein kinase	gene3757
	<i>wzy</i>	Repeat unit polymerase	gene3458
	<i>wzx</i>	Repeat unit transporter	gene3184
	<i>well</i>	Glycosyltransferase	gene3753
EPS	<i>welH</i>	Glycosyltransferase	gene3887
	<i>welG</i>	Glycosyltransferase	gene3155
	<i>welF</i>	Glycosyltransferase	gene2370
	<i>welE</i>	Undecaprenyl-phosphate galactose phosphotransferase; priming glycosyltransferase	gene3893
	<i>rmlA</i>	dTDP-glucose pyrophosphorylase	gene4147
	<i>rmlC</i>	dTDP-4-dehydro-rhamnose-3,5-epimerase	gene4144
	<i>rmlB</i>	dTDP-d-glucose-4,6-dehydratase	gene4146
	<i>wzr</i>	Transcriptional regulator of polysaccharide biosynthesis	gene3897
	<i>wzb</i>	Phosphotyrosine protein phosphatase	gene3970
	<i>liaG</i>	Adhesion LiaG	gene3618
Adhesin	<i>yvlB</i>	Adhesion YvlB	gene3835
	<i>liaG</i>	Adhesion liaG	gene4141
	<i>bcsB</i>	cellulose synthase bcsB	gene0458
			gene1869
cellulose synthase	<i>BcsQ</i>	cellulose synthase bcsQ	gene2873
			gene3971
			gene4479

Table S10. Genes involved in nitrogen fixation and nitrogen metabolism.

Pathway	Gene	Product	Locus Tag
Nitrogen fixation	<i>nif3-like</i>	nitrogen fixation protein Nif 3-like	gene2679
	<i>gltP</i>	glutamate/aspartate: proton symporter GltP	gene1208
Nitrogen metabolism	<i>gltX</i>	Glutamate-tRNA ligase	gene0268
	<i>glnR</i>	transcriptional repressor GlnR	gene0123
	<i>glnA</i>	type I glutamate-ammonia ligase/glutamine	gene1985
	<i>glnH</i>	ABC transporter substrate-binding protein GlnH	gene1986
	<i>glnH</i>		gene2818
Nitrogen regulation	<i>nadR</i>	transcription repressor NadR	gene2863
Dissimilatory nitrate	<i>nirB</i>	nitrite reductase (NADH) large subunit	gene0346
	<i>nirD</i>	nitrate reductase (NADH) small subunit	gene0345

reduction	<i>narI</i>	respiratory nitrate reductase subunit gamma	gene4078
	<i>narH</i>	nitrate reductase subunit beta/nitrate reductase	gene4080
	<i>narJ</i>	molybdenum cofactor assembly chaperone	gene4079
	<i>nar</i>	nitrate reductase subunit alpha	gene4081
	<i>nark</i>	nitrate transporter	gene0349
Ammonia	<i>gltX</i>	glutamate-tRNA ligase	gene0123
assimilation	<i>gltP</i>	glutamate/aspartate: proton symporter GltP	gene1208
			gene0268

Table S11. Genes involved in phosphate solubilization and transport.

Pathway	Gene	Product	Locus Tag
Degradation of phosphonates	<i>phnC</i>	phosphonate transport system ATP-binding	gene2549
	<i>ispH</i>	4-hydroxy-3-methylbut-2-enyl diphosphate reductase	gene2678
	<i>pstA</i>	phosphate ABC transporter, permease protein PstA	gene2658
	<i>pstC</i>	phosphate ABC transporter permease subunit PstC	gene2659
	<i>pstS</i>	phosphate transport system permease protein	gene2660
	<i>pstB</i>	phosphate import ATP-binding protein pstB	gene3698
			gene2656
			gene2657
	<i>gltP</i>	proton glutamate symport protein	gene1208
	<i>phoH</i>	phosphate starvation protein PhoH	gene0268
			gene2698

Table S12. Genes involved in sulfur metabolism.

Pathway	Gene	Product	Locus Tag
Sulfate transport	<i>cysC</i>	adenylyl-sulfate kinase	gene1784
	<i>sat</i>	sulfate adenylyltransferase	gene1783
	<i>cysT</i>	sulfate transport system permease protein	gene0767
	<i>cysK</i>	cysteine synthase A	gene3176
	<i>cysS</i>	cysteine--tRNA ligase	gene0126
	<i>sulP</i>	sulfate permease	gene0199 gene1782
			gene3794

Table S13. Genes involved in chemotaxis.

Pathway	Gene	Product	Locus Tag
Chemotaxis	<i>cheV</i>	chemotaxis protein CheV	gene1613
	<i>ND</i>	chemotaxis response regulator	gene1870
	<i>cheA</i>	chemotactic two-component sensor histidine kinase	gene1871
	<i>cheW</i>	purine-binding hemotaxis protein CheW	gene1872
	<i>cheC</i>	CheY-P-specific phosphatase CheC	gene1873
	<i>ND</i>	chemoreceptor glutamine deamidase CheD	gene1874
	<i>ND</i>	chemotaxis protein	gene0798
	<i>ND</i>	chemotaxis protein	gene1606
	<i>che</i>	methyl-accepting chemotaxis protein	gene3402
			gene3403
			gene3404
			gene3405
			gene1224