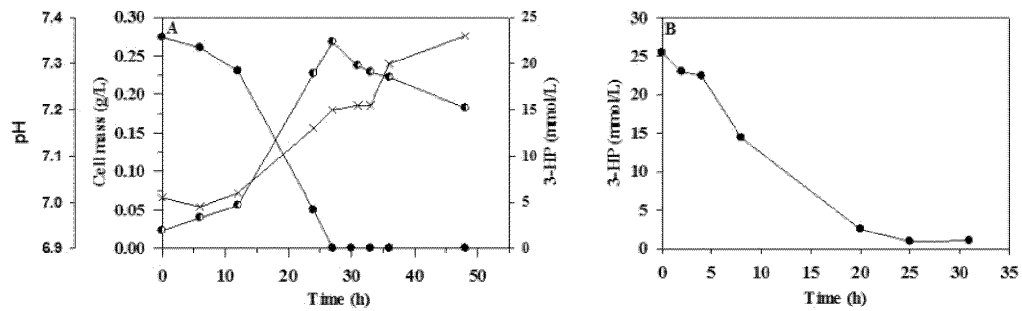
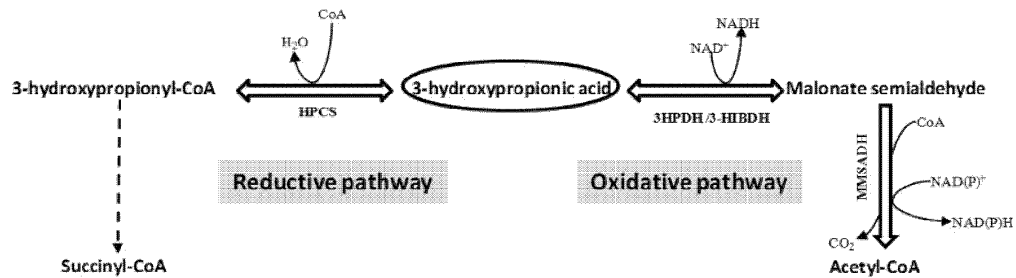


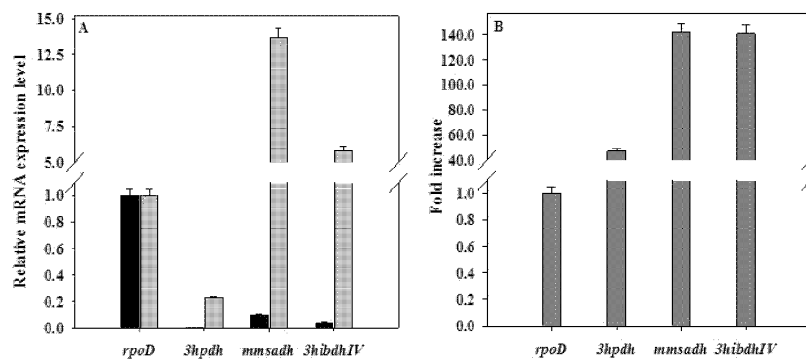
[도1]



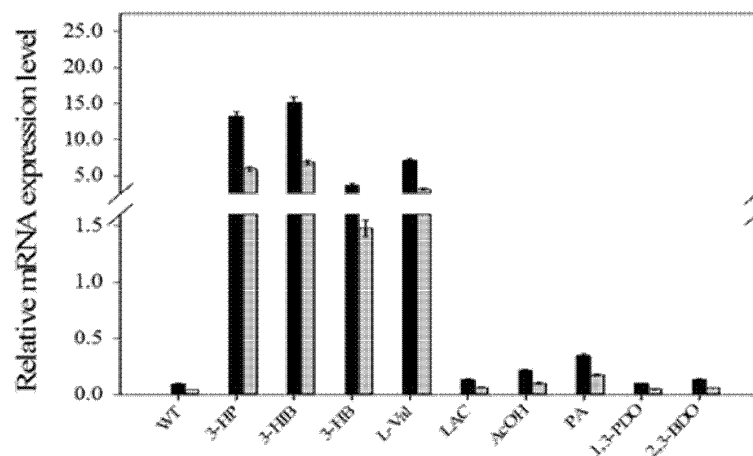
[도2]



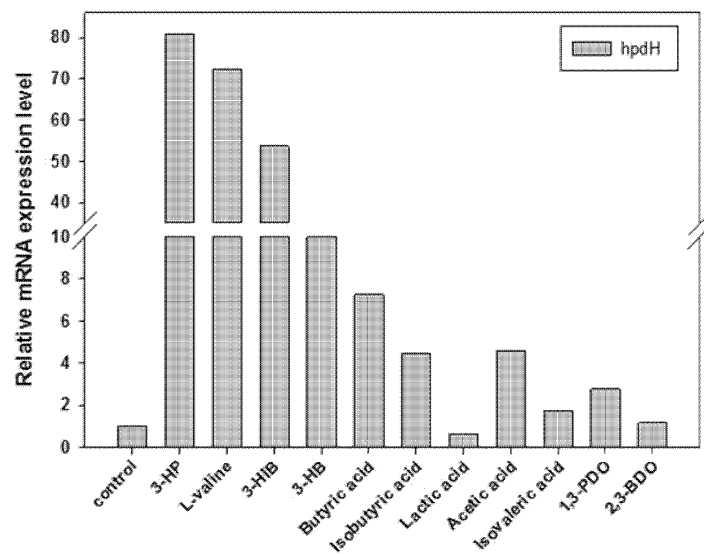
[도3]



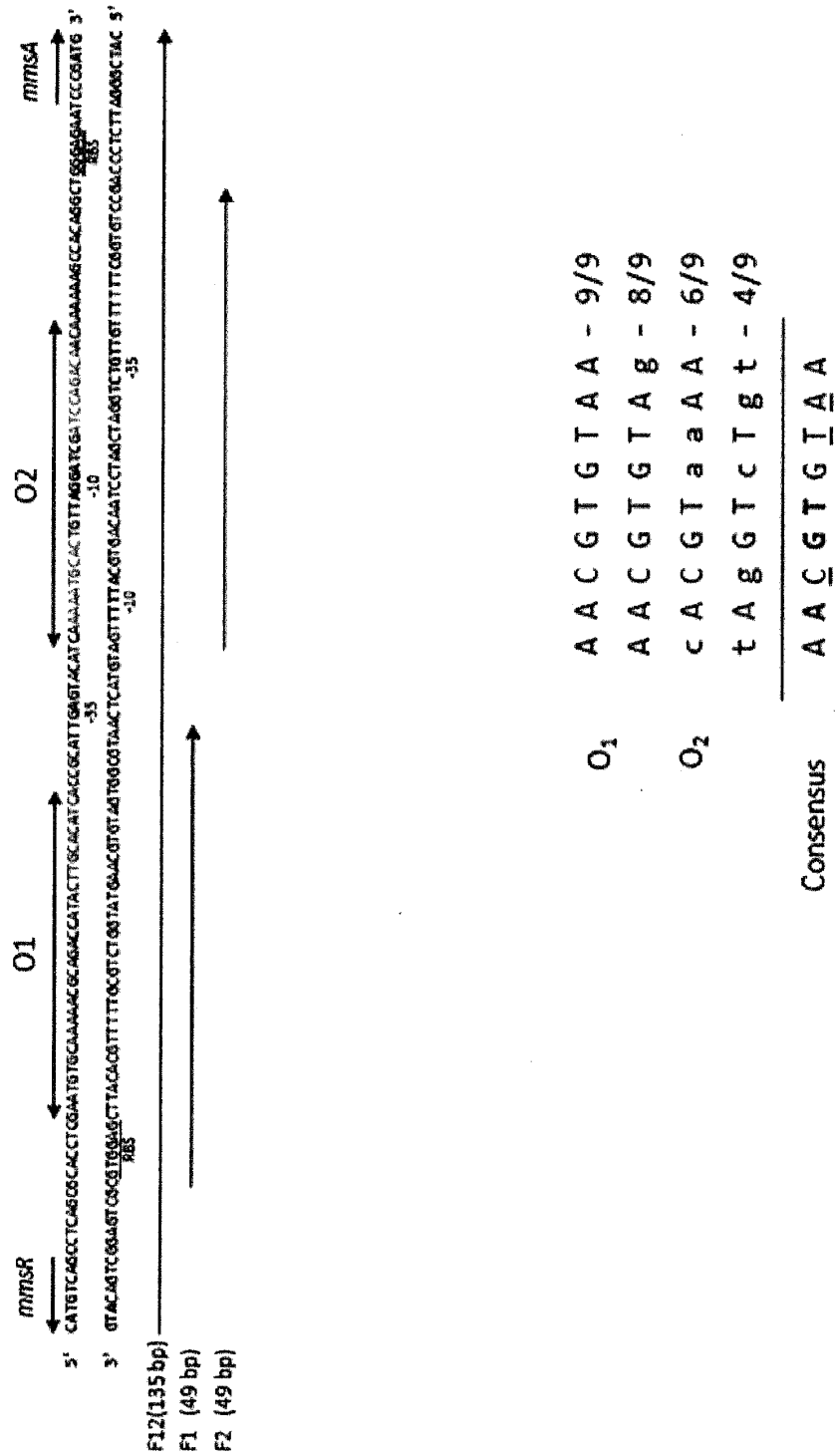
[도4]



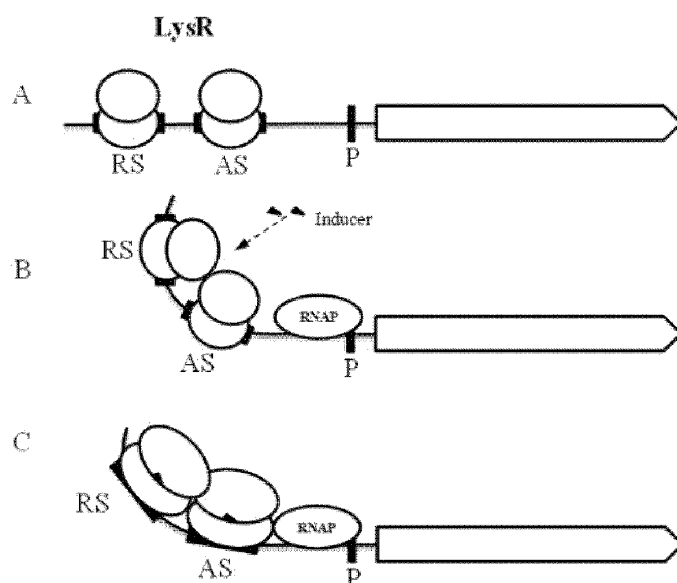
[E5]



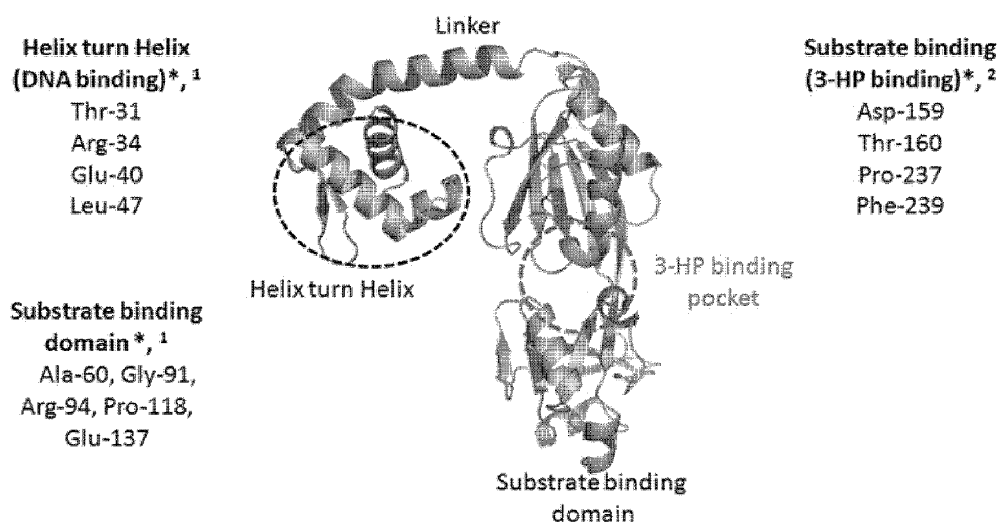
[도 7]



[도8]



[도9]

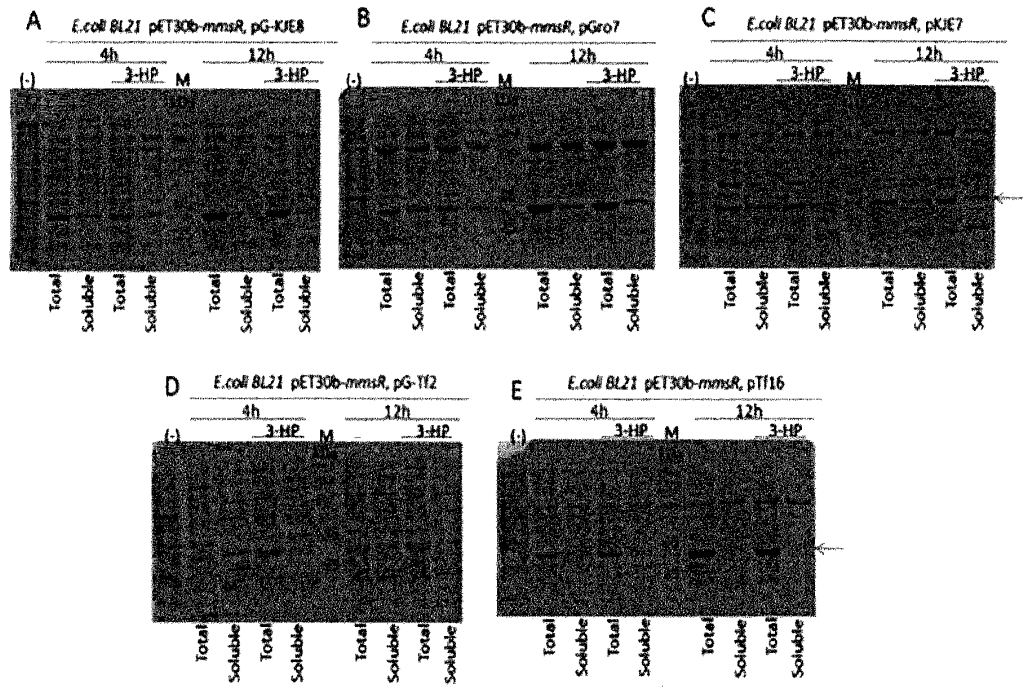


* Highly conserved residues with reference to C4-LysR in *P. denitrificans*.

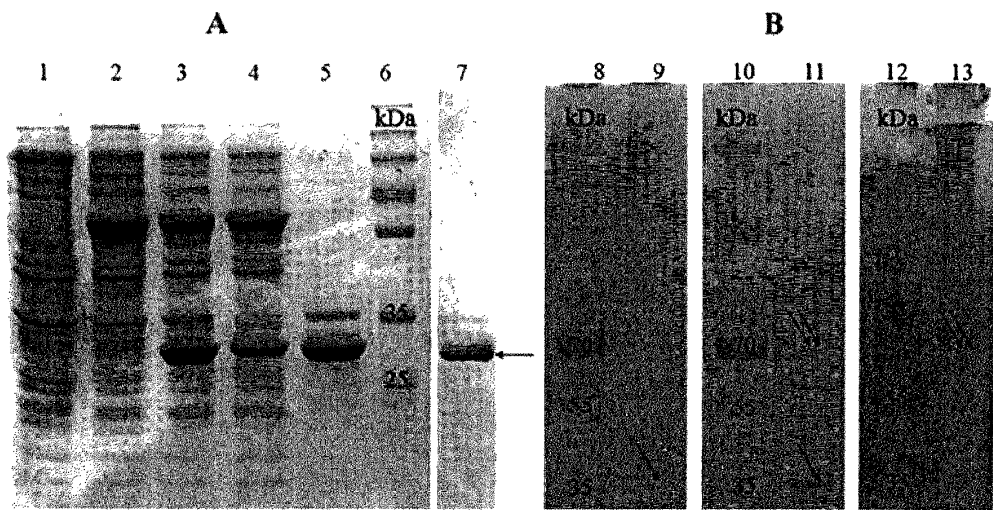
¹ Proposed based on Multiple Sequence Alignment of LysR from 62 different genus; and

² based on molecular modeling, docking and MSA.

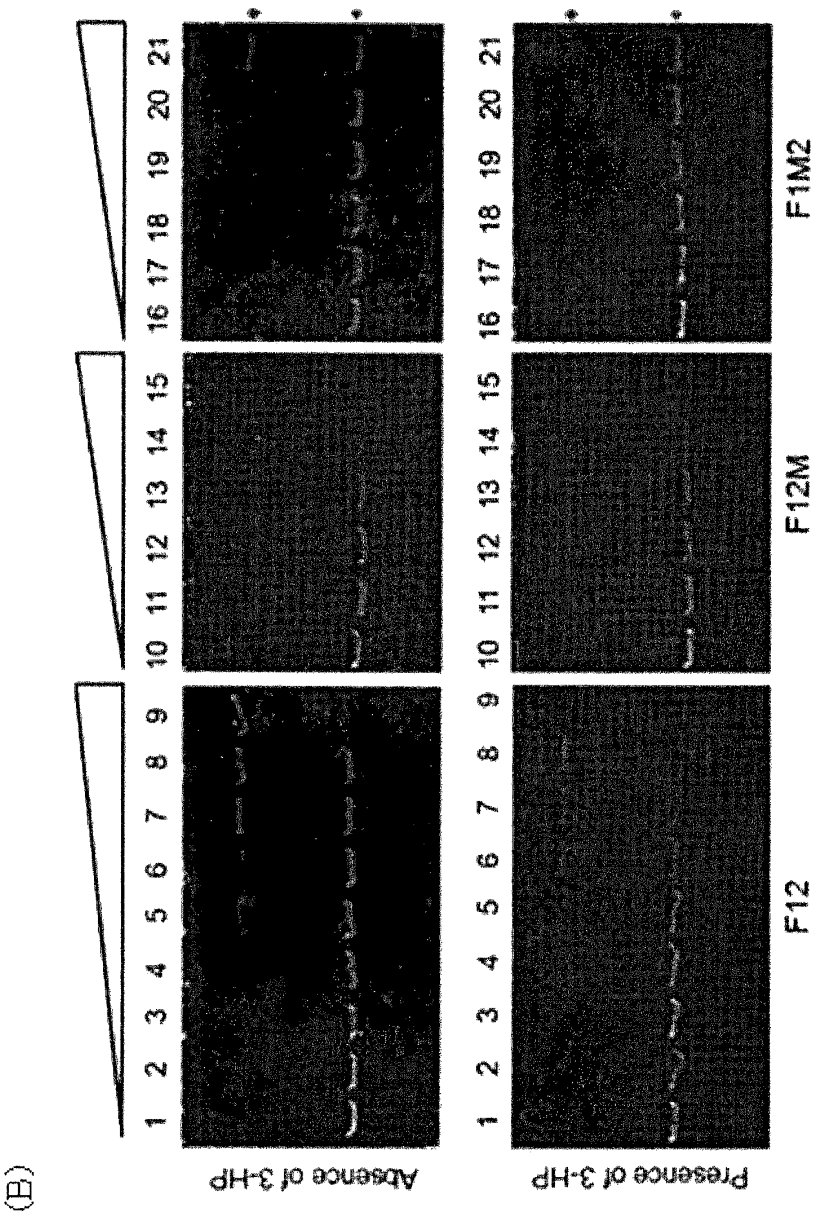
[도 10]



[도 11]



[도 12b]

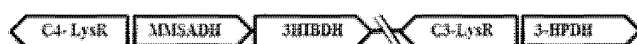


[도 12c]

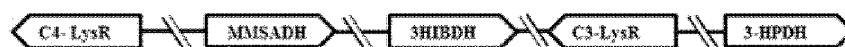
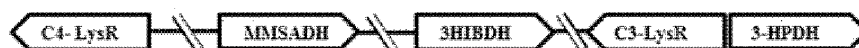
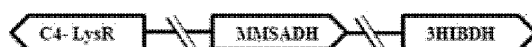
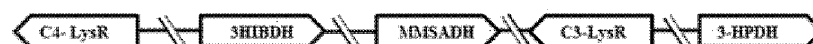
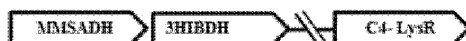
(C)

K₀(nM)	F12	F12M	F1M2	F1M2M
- 3-HP	10.7	18.6	79.8	N/A
+ 3-HP	5.4	19.8	316	N/A

[E13a]

Group 1: *Pseudomonas***Group 2:** *Acinetobacter, Cupriavidus***Group 3:** *Collimonas***Group 4:** *Alcanivorax, Burkholderia***Group 5:** *Corynebacterium, Segniliparus***Group 6:** *Methylocystis, Tatlockia, Curvibacter***Group 7:** *Sphingobium, Polynucleobacter, Bradyrhizobium, Xanthobacter, Catenulispora, Agrobacterium, Methylobacterium, Novosphingobium, Sphingomonas, Thalassospira***Group 8:** *Alicyclophilus, Alteromonas, Kitasatospora, Paracoccus, Simiduia, Sphingopyxis***Group 9:** *Sinorhizobium, Beijerinckia, Aeromonas, Castellaniella, Amycolatopsis*

[E13b]

Group 10: *Verminephrobacter*, *Janthinobacterium*, *Idiomarina*, *Glaciecola*, *Gordonia***Group 11:** *Achromobacter*, *Acidovorax*, *Alcaligenes*, *Halomonas*, *Azospirillum*, *Chromobacterium*, *Comamonas***Group 12:** *Oceanimonas*, *Rastolnia*, *Pseudoalteromonas*, *Ferrimonas*, *Delftia*, *Pseudogulbenkiania*, *Anaeromyxobacter*, *Bordetella***Group 13:** *Phenylobacterium*, *Psychrobacter*, *Shewanella*, *Vibrio*, *Xanthomonas*, *Stenotrophomonas*, *Caulobacter*, *Hahella*, *Kutzneria*, *Rhodomicrobium***Group 14:** *Pseudoxanthomonas*, *Azotobacter***Group 15:** *Parvibaculum*, *Hirschia***Group 16:** *Photobacterium*

[도 14b]

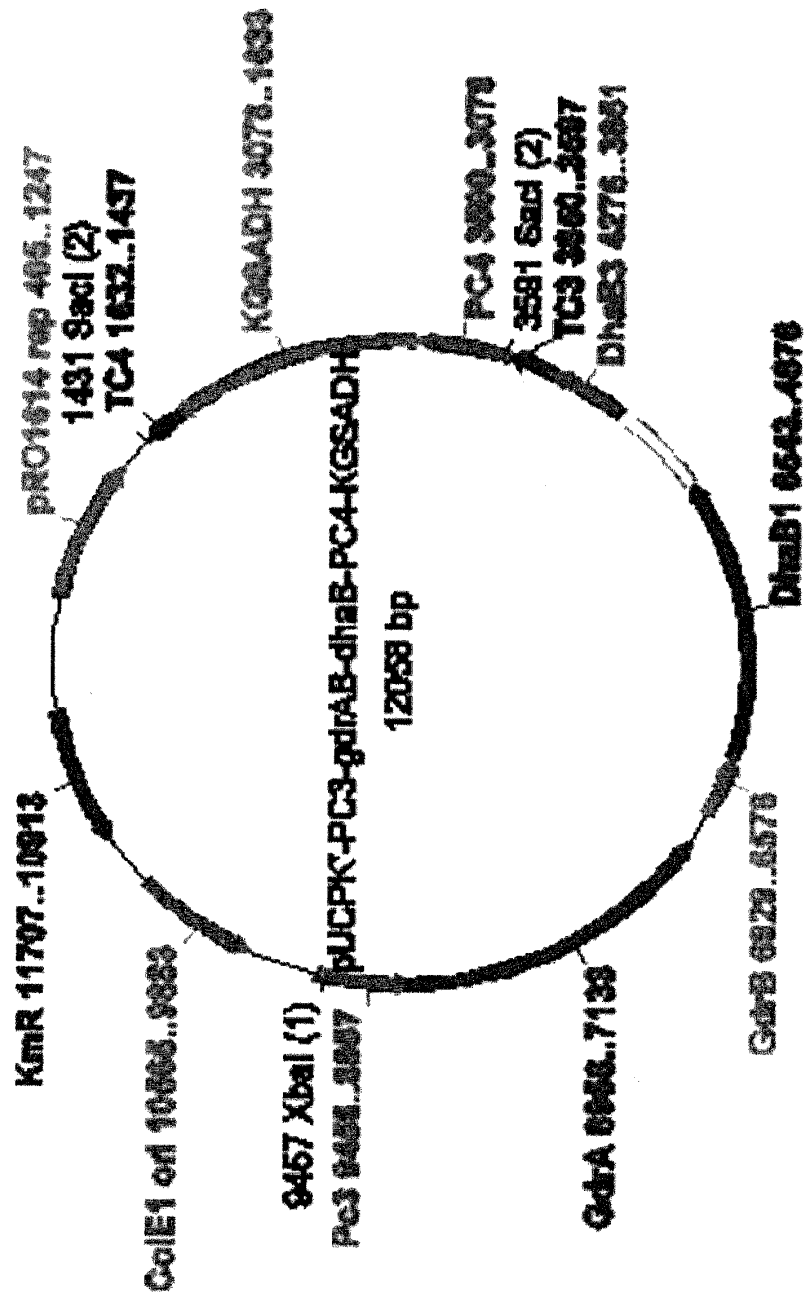
Burkholderia_ubonensis (1)	---	MRHHPEPVSGN	N	D	---	Q	A	G	---	R	R	E	E	---	SR	---
Chelatococcus sp. (1)	---	---	MRE	D	---	A	A	V	---	T	T	E	D	---	KAK	---
Comamonas_arenae (1)	---	---	---	N	---	V	V	VE	---	R	R	F	E	Q	Q	---
Comamonas_fungivorans (1)	---	---	---	N	---	V	V	VE	---	R	R	F	E	Q	Q	---
Comamonas_aquatica (1)	---	---	---	H	---	MA	MA	VG	---	R	R	F	E	Q	Q	---
Comamonas_bada (1)	---	---	---	N	---	---	---	GT	AA	---	---	---	---	---	---	---
Comamonas_compositi (1)	---	---	---	H	---	A	A	AA	---	R	R	F	E	Q	Q	---
Comamonas_granulii (1)	---	---	---	N	---	G	G	AG	VG	---	---	---	---	---	---	---
Comamonas_testosteroni (1)	---	---	---	H	---	---	---	GS	AA	---	---	---	---	---	---	---
Curvibacter_gracilis (1)	---	---	---	NN	---	---	---	GT	VN	---	---	---	---	---	---	---
Curvibacter_binceolatus (1)	---	---	---	NN	---	---	---	GT	VN	---	---	---	---	---	---	---
Dexia_gummosa (1)	---	---	---	---	---	---	---	G	AV	---	---	---	---	---	---	---
Halomonas_elongata (1)	---	---	---	OD	---	---	---	Q	AD	---	---	---	---	---	---	---
Halomonas_habocynthiae (1)	---	---	---	OD	---	---	---	E	D	---	---	---	---	---	---	---
Halomonas sp. (1)	---	---	---	OD	---	---	---	Q	D	---	---	---	---	---	---	---
Herbaspirillum_huttianse (1)	---	---	---	M	---	---	---	Q	VD	---	---	---	---	---	---	---
Herbaspirillum_lustianum (1)	---	---	---	M	---	---	---	Q	VD	---	---	---	---	---	---	---
Herbaspirillum_seropedicae (1)	---	---	---	M	---	---	---	Q	VD	---	---	---	---	---	---	---
Herbaspirillum_sp. (1)	---	---	---	M	---	---	---	Q	VD	---	---	---	---	---	---	---
Janthinobacterium_lividum (1)	---	---	---	M	---	---	---	AG	VD	---	---	---	---	---	---	---
Janthinobacterium_sp. (1)	---	---	---	M	---	---	---	AG	VD	---	---	---	---	---	---	---
Kiloniella_lamarinae (1)	---	---	---	M	---	---	---	G	II	---	---	---	---	---	---	---
Magnetospirillum_gryphowaldense (1)	---	---	---	ND	---	---	---	GR	MD	---	---	---	---	---	---	---
Marinobacterium_stanieri (1)	---	---	---	M	---	---	---	AN	D	---	---	---	---	---	---	---
Microvibrio_sp. (1)	---	---	---	MSA	---	---	---	AG	PA	---	---	---	---	---	---	---
Microvibrio_aerodentificans (1)	---	---	---	---	---	---	---	ET	VQ	---	---	---	---	---	---	---
Muria_flava (1)	---	---	---	---	---	---	---	Q	AG	---	---	---	---	---	---	---
Nivospirillum_rakense (1)	---	---	---	MAE	---	---	---	G	IL	---	---	---	---	---	---	---
Ongeta_urethralis (1)	---	---	---	---	---	---	---	S	D	---	---	---	---	---	---	---
Ottowia_thioxydans (1)	---	---	---	---	---	---	---	G	AA	---	---	---	---	---	---	---
Pandoraea_apista (1)	---	---	---	---	---	---	---	Q	AA	---	---	---	---	---	---	---
Pandoraea_sp. (1)	---	---	---	---	---	---	---	Q	AA	---	---	---	---	---	---	---
Pannonibacter_phragmitetis (1)	---	---	---	---	---	---	---	AG	LG	---	---	---	---	---	---	---
Peridichaea_piscinae (1)	---	---	---	---	---	---	---	A	D	---	---	---	---	---	---	---
Polynucleobacter_necessarius (1)	---	---	---	---	---	---	---	D	EG	---	---	---	---	---	---	---
Pseudogulbenkiania_ferrooxidans (1)	---	---	---	---	---	---	---	---	IV	---	---	---	---	---	---	---
Pseudomonas_aeruginosa (1)	---	---	---	---	---	---	---	HTA	S	---	---	---	---	---	---	---
Pseudomonas_alkyphenolia (1)	---	---	---	---	---	---	---	RT	AA	---	---	---	---	---	---	---
Pseudomonas_amygdali (1)	---	---	---	---	---	---	---	R	AS	---	---	---	---	---	---	---
Pseudomonas_...	---	---	---	---	---	---	---	R	S	---	---	---	---	---	---	---

Pseudomonas_azotifigens	(1)	N	AG	T	Q	EPG	R	EPAGRG
Pseudomonas_baleanica	(1)	N	AG	S	Q	EPG	R	EPAGRN
Pseudomonas_bauzanensis	(1)	N	AG	T	Q	EPG	R	EPAGRS
Pseudomonas_chloridismutans	(1)	N	AG	T	Q	EPG	R	EPAGCN
Pseudomonas_chlororaphis	(1)	N	RA	T	S	EA	L	SRT
Pseudomonas_conjugata	(1)	N	RA	T	S	EA	L	SRT
Pseudomonas_cremoricolorata	(1)	N	RA	T	S	EA	L	SRT
Pseudomonas_dentrificans	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_fluorescens	(1)	N	RA	V	R	Q	EPG	EPAGHG
Pseudomonas_friedrichbergensis	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_fulva	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_japonica	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_knaackmussii	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_lutea	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_mandelii	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_mediterranea	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_mendocina	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_montellii	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_nitroreducens	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_parafulva	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_pleuroglossida	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_protegens	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_pseudocatalanensis	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_psychochromatolans	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_putida	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_resovirans	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_rhodesiae	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_savastanoi	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_smariae	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_sp.	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_stutzeri	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_syringae	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_taiwanensis	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_thermotolerans	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_tobiasi	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_umsongensis	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_virdiflava	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_vancouveriensis	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_xanthomonas	(1)	N	AG	V	R	Q	EPG	EPAGHG
Pseudomonas_sp.	(1)	N	AG	V	R	Q	EPG	EPAGHG

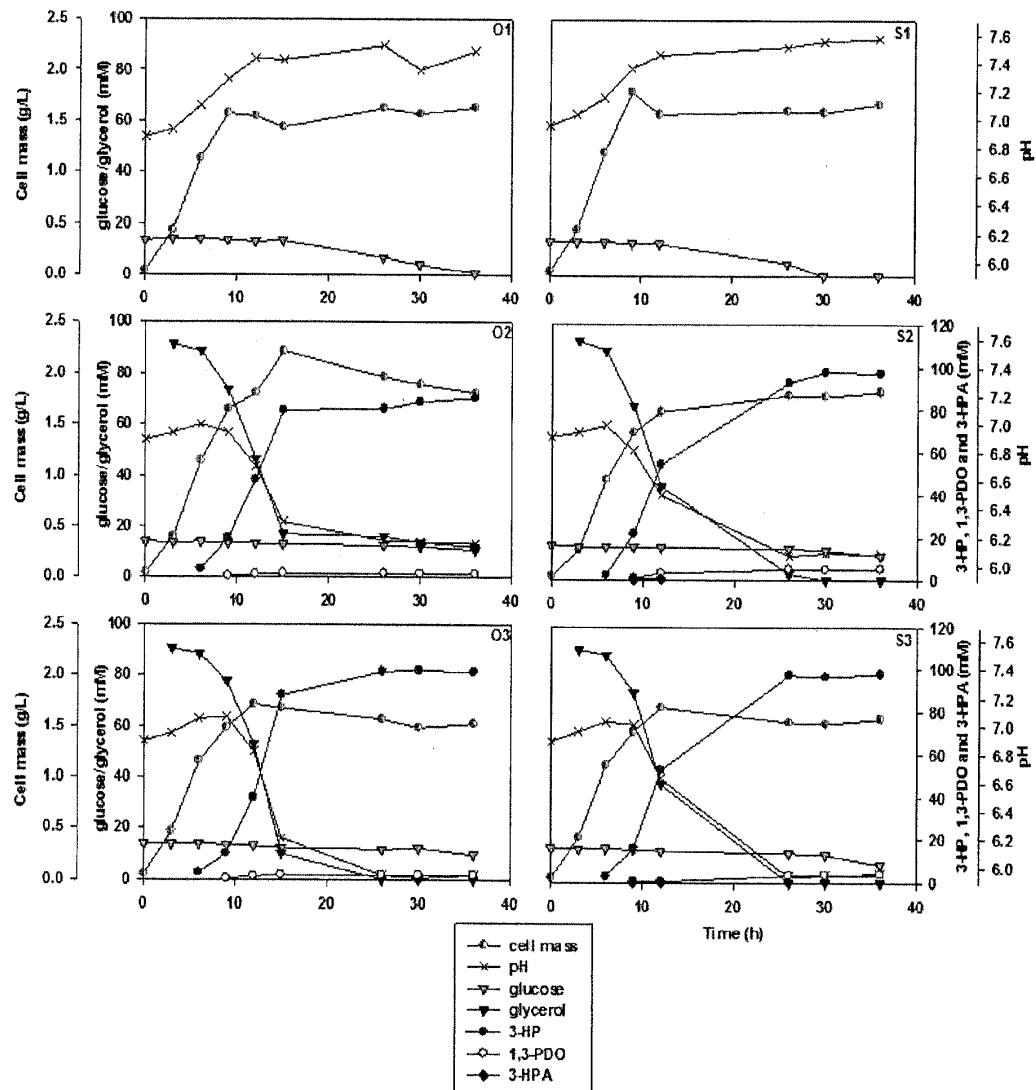
	(1)	1	10	20	30	40	50	60	70	81
Achromobacter_sp.	(1)	M	S	OR SA	I	R	E TE	L LI	E SRSA	V E DQR FVH
Acidovorax_avenae	(1)	N	N	H AA	I	O	E KC	E SI	A TAG-	H R Z GRH PAV A
Acidovorax_citrulli	(1)	N	N	H AA	I	O	E KC	E SI	A TAG-	H R Z GRH PAV A
Acidovorax_defoliifl	(1)	N	N	H AA	I	O	E KC	E SI	A TAG-	H R Z GRH PAV A
Acidovorax_ebreus	(1)	N	N	H AA	I	O	E KC	E SI	A TAG-	H R Z GRH PAV A
Acinetobacter_baumanni	(1)	MK	N	KI IN	I	O	E L	E I	I KEAT-	F LE MA PRV
Acinetobacter_guillouiae	(1)	MK	N	KI IN	I	O	E L	E I	I KEAT-	F LE MA PRV
Acinetobacter_glycinebergii	(1)	MK	N	KI IN	I	O	E L	E I	I KEAT-	F LE MA PRV
Acinetobacter_johnsonii	(1)	MK	N	KI IN	I	O	E L	E I	I KEAT-	F LE MA PRV
Acinetobacter_junii	(1)	MK	N	KI IN	I	O	E L	E I	I KEAT-	F LE MA PRV
Acinetobacter_soli	(1)	MK	N	KI IN	I	O	E L	E I	I KEAT-	F LE MA PRV
Advenella_kashimirensis	(1)	MP	N	HR SA	I	RH	E AD	Q LL	E SRRS	I R G QO AH
Aflpia_brigiae	(1)	MTDQF	NL	S A H	K	A	E TA	O	E DRIS-	SS E GDR Z
Aflpia_broomae	(1)	MTDQF	NL	S A H	K	A	E TA	O	E DRIS-	SS E GDR Z
Agrobacterium_tumefaciens	(1)	NM	N	QF S	C	S	E RA	O	E L STN	CE E GQR AC H
Alcaligenes_faecalis	(1)	N	N	CO SV	P	O	E OE	L RL	E STVS	JS SEQN PQRM
Alkylcyclobius_denitrificans	(1)	N	N	I AA	I	O	E KC	E PI	A EAA-	H R Z GRH PAV A
Alkylcyclobius_caulinodans	(1)	--AVTGADE	N	S IA	I	O	E TA	O	E DRIG-	IL POER
Azohizobium_lipoferum	(1)	--MADFN	N	S IA	I	O	E TA	O	E DRIG-	IL POER
Azospirillum_sp.	(1)	MADFN	N	I II	C	RA	I ED	R VI	E RPS-	I POER KQT
Bordetella_hazali	(1)	M	S	OR SA	I	R	E AE	L LI	E SRSA	V E DQR FVH
Bordetella_petrii	(1)	M	S	OR SA	I	R	E AE	L LI	E SRST	V E DQR FVH
Bordetella_trematum	(1)	M	S	OR SA	I	R	E AE	L LI	E SRST	V E DQR FVH
Bosea_sp.	(1)	MERFM	N	R IA	A	AT	I EF	R AKT	E RPQ	I ANGER AK
Bradyrhizobium_yuanningense	(1)	MLDG	N	S SA	C	AT	I DR	E KH	S AKT	D RTI L E GQR
Brucella_abortus	(1)	--RNRPFIT	N	O ST	C	RTS	VI I	DR	E O S SKG	E NPR- ST H GEEL
Brucella_inopinata	(1)	--QAKNA	N	O C	G	N	I ET	E T S ILLI	RIIN- ST H GEEL	
Brucella_melitensis	(1)	--QAKNA	N	O C	G	N	I ET	E T S ILLI	RIIN- ST H GEEL	
Brucella_neotomae	(1)	--RNRPFIT	N	O ST	C	RTS	VI I	DR	E O S SKG	E NPR- ST H GEEL
Brucella_ovis	(1)	--QAKNA	N	O C	G	N	I ET	E T S ILLI	RIIN- ST H GEEL	
Brucella_pinnipedialis	(1)	MPAQAKNA	N	O C	G	N	I ET	E T S ILLI	RIIN- ST H GEEL	
Brucella_sp.	(1)	--QAKNA	N	O C	G	N	I ET	E T S ILLI	RIIN- ST H GEEL	
Brucella_suis	(1)	--QAKNA	N	O C	G	N	I ET	E T S ILLI	RIIN- ST H GEEL	
Burkholderia_ferreliae	(1)	TAM	N	OR SA	I	RE	E TI	V I	D SRAG	V AEGOK AY
Burkholderia_glaethi	(1)	--MRQF	N	R IA	O	AT	I A	E IG	V RI	D RS V V PEER AD
Burkholderia_nodosa	(1)	--TAM	N	OR SA	I	RE	E TI	V I	D SRAG	V AEGOK AY
Collimonas_avenae	(1)	--TNAM	N	V H	O	ET	I HR	E EC	Q L ENNQ	I AFGRH Z
Collimonas_funigivans	(1)	--TKAM	N	V H	O	ET	I HR	E EC	Q L ENNQ	I AFGRH Z

Polynucleobacter_necessarius (1)
Pseudogubekienia_sp. (1)
Pseudomonas_aetnogenea (1)
Pseudomonas_agari (1)
Pseudomonas_alkyphenolia (1)
Pseudomonas_batumici (1)
Pseudomonas_brassicae (1)
Pseudomonas_chloritidulans (1)
Pseudomonas_chlororaphis (1)
Pseudomonas_corrugata (1)
Pseudomonas_cremicolorata (1)
Pseudomonas_denticulans (1)
Pseudomonas_extrem australis (1)
Pseudomonas_fluorescens (1)
Pseudomonas_friedlandbergensis (1)
Pseudomonas_fuscovaginae (1)
Pseudomonas_japonica (1)
Pseudomonas_knockmussa (1)
Pseudomonas_luteola (1)
Pseudomonas_mediterranea (1)
Pseudomonas_nitroreducens (1)
Pseudomonas_parsiflava (1)
Pseudomonas_pleocoglossida (1)
Pseudomonas_protogens (1)
Pseudomonas_psydrophila (1)
Pseudomonas_puella (1)
Pseudomonas_rhizospherae (1)
Pseudomonas_sp. (1)
Pseudomonas_stutzeri (1)
Pseudomonas_tolosa (1)
Pseudomonas_umsongensis (1)
Pseudomonas_verona (1)
Pseudomonas_vranovensis (1)
Pseudomonas_xanthomaxina (1)
Pseudomonas_sp. (1)
Rhizobium_alams (1)
Rhizobium_eta (1)
Rhizobium_freteli (1)
Rhizobium_gladina (1)
Rhizobium_leguminosarum (1)
Rhizobium_phaseoli (1)
Rhizobium_sulbale (1)
Simplicispira_psydrophila (1)
Sinorhizobium_americanum (1)
Sinorhizobium_medkage (1)
Sneathiella_glossodonpedis (1)
Spirobacter_sp. (1)
Streptomyces_sp. (1)
Tistrella_mobilis (1)
Variovorax_paradoxus (1)
Variovorax_sp. (1)
Xanthobacter_sp. (1)
Consensus (1)

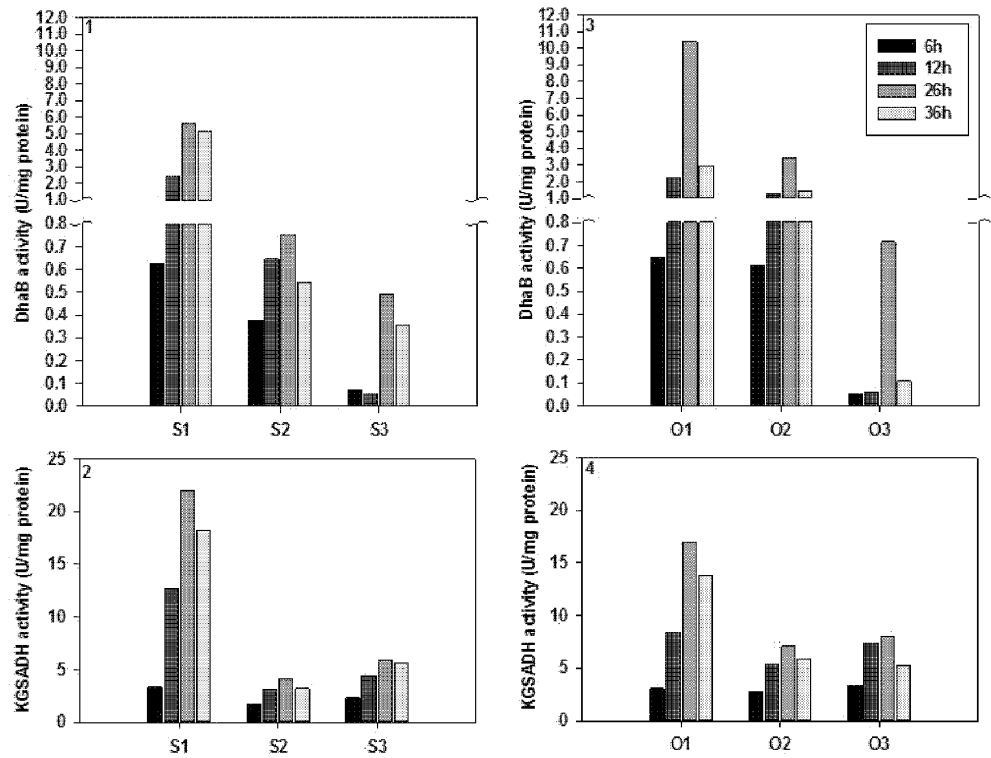
[도 16]



[도 17]



[도18]



[도19]

