

Figure S7. Specificity determining positions (SDP) analysis of the *Bpe*AQPs transporting non-aqua substrates from *Betula pendula*. SDP were predicted from alignments with putative amino acid sequences of the AQPs predicted to transport non-aqua substrates (marked in red). Multiple alignments were performed using ClustalX. The SDPs are highlighted in yellow. The Genbank accession numbers of the representative sequences used for alignments: *At*PIP1;2 (Q06611), *At*PIP2;1 (P43286), *At*PIP2;4 (Q9FF53), *At*TIP1;1 (P25818), *At*TIP1;2 (Q41963), *At*TIP2;1 (Q41951), *At*TIP2;3 (Q9FGL2), *At*TIP4;1 (O82316), *At*NIP1;2 (Q8LFP7), *Cp*NIP1 (CAD67694), *Gm*NOD26 (P08995), *Hv*PIP1;3 (BAA23745), *Hv*PIP1;4 (BAF33068), *Hv*PIP2;1 (BAA23744), *Nt*AQP1 (O24662), *Nt*TIPa (Q9XG70), *Os*NIP2;1 (Q6Z2T3), *Ta*TIP2;1 (AAS19468), *Ta*TIP2;2 (AAS19469), *Zm*PIP1;1 (Q41870), *Zm*PIP1;5 (Q9AR14).

*The *Bpe*XIP2;1 sequence used for the analyses was the redefined sequence (redefinition detailed in the Figure S4)

Ammonia transporters

TIP

	110	120	130	140	150	160	170	180	190	200
<i>AtTIP2;1</i>	VNP	AVTFGLAVGGQITVITGVFYWIAQLL	GSTAACFLLKYVTGGGLAVPTHSV	AAGLGSIEGVVMEIIITFALVYTVYATAADPKKGS	SLGTIAPLAIGLIV					
<i>AtTIP2;3</i>	LNP	AVTLGLAIGGNITLITGFFYWIAQCLGSIVACLLLVFVTNGKSVPTHGVS	SAGLGAVEGVVMEIIVTFALVYTVYATAADPKKGS	SLGTIAPIAIGFIV						
<i>TaTIP2;1</i>	VNP	AVTFGLALGGQITILTGIFYWVAQLLGAIVGAFLVQFCTG-VATP	THGL-SGVGAFEGVVMEIIVTFGLVYTVYATAADPKKGS	SLGTIAPIAIGFIV						
<i>TaTIP2;2</i>	VNP	AVTFGLALGGQITILTGIFYWVAQLLGAIVGAFLVQFCTG-VATP	THGL-SGVGAFEGVVMEIIVTFGLVYTVYATAADPKKGS	SLGTIAPIAIGFIV						
<i>GmNOD2;6</i>	FNP	AVTIAFASTRRFPLIQVPAYVVAQLLGSILASGTLRLLFMGNHDQESG	TVPNGTNLQAFVFEFIMTFFLMFVICGVATDNR--AVGEFAGIAIGSTL							
<i>BpeTIP1;1</i>	VNP	AVTFGAFIGGNITLLRGIVYWIAQLLGS	TVACLLLKFFATNGLTTSAFSLSSGVGVWNAFVLEIVMTFGLVYTVYATAVDPKRGS	VGVIAPIAIGFIV						
<i>BpeTIP1;2</i>	VNP	AVTFGAFGLGGHISLIRGLLYWVAQLLGS	VVACLLLKFFSTGGLET	PAFSLSSDVS	VWNAV	VLEIVMTFGLVYTVYATAVDPKKGNIGILAPIAIGLIV				
<i>BpeTIP1;3</i>	VNP	AVTFGAFIGGNITLLRTILYWIAQLLGS	VVACLLLKFFATGGLET	SAFSLSSGVSVWNAV	VFEIVMTFGLVYTVYATAVDPKKGNVGT	VAPIAIGFIV				
<i>BpeTIP2;1</i>	VNP	AVTFGLALGGQITLLTGIFYWIAQLLGS	IAACFLLKAVTG-LAIP	THSVASGVGAIEGVVMEIIITFALVYTVYATAADPKKGS	SLGTIAPIAIGFIV					
<i>BpeTIP2;2</i>	LNP	AVTFGLALGGNITILTGIFYWIAQCLGSIVACLLLQFVTNGLSIP	THGVASGMNAVEGVVMEIIVTFALVYTVYATAADPKKGS	LGIIAPIAIGFIV						
<i>BpeTIP3;1</i>	VNP	AVTFGTLLGGRISVLR	AVFYWIAQLLGA	VASLLRLVTNNMRPVGFYVTS	SGVGEWHGLIFEIVMTFTLVYTVFATAIDPKRGS	SLGTIAPLAIGFIV				
<i>BpeTIP4;1</i>	LNP	AVTLGLLAGGHITIFRSFLY	WIDQLLAASAACII	LYITGGGLTTP	IHSLASGVGYLQGV	IWEVILTFSL	LFTVYATIVDPKKGALDGLGPTLTG	FVV		
<i>BpeTIP5;1</i>	VNP	AVTFGM	AVGGHISVPTALFYWLSQMLASV	MASLLLKMTVVGQHVPT	YVIAEEMTGFGASLMEGVLT	FALVYTVYA-AGDTRRGT	MGAIGPIAIGSIA			
	210	220	230	240	250	260	270			
<i>AtTIP2;1</i>	GANILAAGPFSGGSMNP	ARSFGPAVAAGDFSGHWVYWG	PLIGGGLAGLIYGNVFMG----	SSEHVPLASADF-----						
<i>AtTIP2;3</i>	GANILAAGPFSGGSMNP	ARSFGPAVVS	GDLSQIWIYWVG	PLVGGALAGLIYGDVFIG----	SYEAVETREIRV-----					
<i>TaTIP2;1</i>	GANILVAGPFSGGSMNP	ARSFGPAVASGDF	TNIWVYWAGPLIGGGLAGV	VYRYLYMC----	D-DHSSVAGNDY-----					
<i>TaTIP2;2</i>	GANILVAGPFSGGSMNP	ARSFGPAVASGDF	TNIWVYWAGPLIGGGLAGV	VYRYVYMC----	D-DHSSVAGNDY-----					
<i>GmNOD2;6</i>	LLNVIIGGPVTGAS	MNP	ARSLGPAFVHGEYEG	IWIYLLAPVVGAIAGAWV	YNIVRYT----	DKPLSETTKSASFLKGRAASK				
<i>BpeTIP1;1</i>	GANILAGGAFDGAS	MNP	AVSFGPALVSWT	WENHWVYWAGPLIGGGLAGLV	YEFFFFI----	SHNTHEQLPTTDY-----				
<i>BpeTIP1;2</i>	GANILAGGAFDGAS	MNP	AVSFGPAVVS	WSWDNHVYWG	PLIGSAIAAIVYELIFI----	SPNTHEPLPATDF-----				
<i>BpeTIP1;3</i>	GANILVGGAFDGAS	MNP	AVSFGPAVVS	SWTNHWVYWL	GPMVGAIAAIVYDTLFIG----	EPTHEPLPTNDF-----				
<i>BpeTIP2;1</i>	GANILAAGPFSGGSMNP	ARSFGPAVASGDF	HDNWIYWAGPLVGGGLAGLIYGNV	FMY----	SQHAPLTN-DF-----					
<i>BpeTIP2;2</i>	GANILAAGPFSGGSMNP	ARSFGPAVVS	GDFSQNIWYWG	PLIGGGLAGLVYGGIFIG----	SYEPLPPSQDYA-----					
<i>BpeTIP3;1</i>	GANILAGGPF	DGACMNP	ARAFGPALVGRWRN	HWIYWGP	LLGGGLAGLVYEY	MPV	IPTEVPHHTHQP	LAP	EDY-----	
<i>BpeTIP4;1</i>	GANILAGGAFSGAS	MNP	ARSFGPALISGD	WDTHWVYWG	PLIGGGLAGFIYENFF	FIVR---	SHVPIPT	EEERY-----		
<i>BpeTIP5;1</i>	GANVLAAGPFSGGSMNP	ACAFGSAV	TAGSFKNQAVYWG	PLIGAAAAGLVYDN	VVFPS---	SQAPEGVGV-----				

NIP

	110	120	130	140	150	160	170	180	190	200
<i>At</i> TIP2;1	KLTSDAALDTPGLVAIAVCHGFALFVAVAIGANISGGHVNPAVTFGLAVGGQITVITGVFYWIAQLLGSTAACFLLKYVTGGGLAVP	THSV	AAGLGSIEGV							
<i>At</i> TIP2;3	KLTSDGALDPAGLVAIAIAHAFALFVGVSIAANISGGHLNPAVTLGLAIGGNITLITGFFYWIAQCLGSIVACLLLVFVTNGKSVPT	THGV	SAGLGAVEGV							
<i>Ta</i> TIP2;1	KVSGGAPLDPSGLIAVAICHGFGFLFVAVAIGANISGGHVNPAVTFGLALGGQITILTGFIFYWVAQLLGAIVGAFLVQFCT-GVATP	THGLS	-GVGAFEGV							
<i>Ta</i> TIP2;2	KVSGGAPLDPSGLIAVAICHGFGFLFVAVAIGANISGGHVNPAVTFGLALGGQITILTGFIFYWVAQLLGAIVGAFLVQFCT-GVATP	THGLS	-GVGAFEGV							
<i>Gm</i> NOD2;6	NYYN-----MITFPGIAIVWGLVLTVLVYTVGHISGGHFNPAVTIAFASTRRFPLIQVPAYVVAQLLGSILASGTLRLLFMGNHDOF	SGTVPNGTNLQAF								
<i>Bpe</i> NIP1;1	IYGS-----VTFPGICVTWGLIVTVMIIYTVGHISGAHFNPAVTITSAIFRRFPYKEVPLYIAAQLMGSILASGTLALVFDVTPDAY	FGTVP	TSNSQSL							
<i>Bpe</i> NIP4;1	IYGS-----VSFPGICVVWGLIVMVMISVGHISGAHFNPAVTITFAIFRRFPLKQVPLYIVAQMIGSTLASATLCAFPVDKKSFFGT	APVGS	NFQAL							
<i>Bpe</i> NIP1;2	GNDK-----VVTAPGVSIVWGLAVMVLVYSVGHISGAHFNPAVTIAFATCRRFPWKQVPAYVSAQVLGSTMASGTLRLIFNGHENR	FGTIP	PAGSNLQSF							
<i>Bpe</i> NIP2;1	ADEN-----KVSCLAASVAGGLIVTVMIIYAVGHISGAHFNPAVTIAFAAVRHFPWKQVPLIAAAQLAGAISAAFTLRVILNPIKE	-LGTT	SPTGTEIEAL							
<i>Bpe</i> NIP5;1	KYNG-----AESLIGNAACAGLAVMVMVLSTGHISGAHFNPSVTIAFATLRHFPWLQVPAYIAAQVSGSICASFALKGVFHPYMSG	-GVTVP	SVTEGQAF							
<i>Bpe</i> NIP5;2	KYQG-----AETLIGSAACAGLAVMVMVLSTGHISGAHFNPSVTIAFAALRHFPWVQVPGYLVAQVVSASICAFAFALKGVFHPMSG	-GVTVP	PAVGIGQAF							
<i>Bpe</i> NIP6;1	KTHG-----SETLLGCAASSGLAVMVMVLSTGHISGAHFNPAVTIAFAALRHFPWKHVPYIGAQVVASFCAAFALKGVFHPIMGG	-GVTVP	PSGSYQAF							
<i>Bpe</i> NIP7;1	LSKG-----EVGLLEYAATAGLTVVVVIFSIGHISCAHVNPAVTIAFATFGHFPWSKVPLYILAQTLGSVLATCIGQSVYD-VKSEFMT	TRPLR	GCSSAF							
	210	220	230	240	250	260	270	280	290	300
<i>At</i> TIP2;1	VMEIIITFALVYTVYATAADPKKGSLSGTIAPLAIGLIVGANILAAGPFSGGSMNPARSFGP	AVAAAGDFSGH	VWVWG	PLIGGGLAGLIYGNVFMGSSEHV						
<i>At</i> TIP2;3	VMEIVVTFALVYTVYATAADPKKGSLSGTIAPIAIGFIVGANILAAGPFSGGSMNPARSFGP	AVVSGDLSQIWIYWG	PLVGGALAGLIYGDVFIGSYEAV							
<i>Ta</i> TIP2;1	VMEIIVTFGLVYTVYATAADPKKGSLSGTIAPIAIGFIVGANILVAGPFSGGSMNPARSFGP	AVASGDFTNIWVYWG	PLIGGGLAGVVYRYLYM-CDDHS							
<i>Ta</i> TIP2;2	VMEIIVTFGLVYTVYATAADPKKGSLSGTIAPIAIGFIVGANILVAGPFSGGSMNPARSFGP	AVASGDFTNIWYWG	PLIGGGLAGVVYRYVYM-CDDHS							
<i>Gm</i> NOD2;6	VFEFIMTFFLMFVICGVATDNR--AVGEFAGIAIGSTLLNVIIGGPVTGASMNPARSLGPAFVHGEYEGIWIIYLLAPVVGAIAGAWVYNIVRYTD	KPLS								
<i>Bpe</i> NIP1;1	VLEILCSFLLMFVISGVTTDSR--AISEVAGIAVGMTILLNVFIAGPVSGASMNPARSIRPAVIKHVYKGLWVYIVGPIIGTIAGAFAYNLIRST	DKPLQ								
<i>Bpe</i> NIP4;1	IIIEIIISFLLMFVICGVATDNR--AIGELAGIAVGMTITLNVFVAGPVSGASMNPARSIGPALLTHMYKGLWIIYILGPLAGTILGGFAYNMIRFT	DKPLR								
<i>Bpe</i> NIP1;2	ALEFIIITFYLMFVISGVATDNR--AIGELAGLAVGSTILLNVFAGPVSGASMNPARSLGPAIVHNKYESIWVYLVATTLGAIAGGMVYNIIRFT	DKPLR								
<i>Bpe</i> NIP2;1	VMEIVVTFVTMMFTASAVATDTK--AIGELAGLAVGSAVCITSILAGPISGGSMNPARTIGPAIASASYKGIWVYLVGPVTGTLLGAWSYKLIRVS	DEPLY								
<i>Bpe</i> NIP5;1	ALEFIIITFNLLFVVTAVATDTR--AVGELAGIAVGATVLVNILVAGPSSGGSMNPVRTLGPAIAAGNYKSLWIIYLVAPTTLGALTGAGVYTAVKLRE	DEV-								
<i>Bpe</i> NIP5;2	ALEFIVTFTLLFVITAVATDTC--AVGEFAGIAIGGTVMNLILVAGTTTGASMNPNVRTIGPAIAAGTYKGFWIYMVAPILGALAGAGTYTFVKLAED	GV-								
<i>Bpe</i> NIP6;1	ALEFIIISFNLMFVVTAVATDTR--AVGELAGIAVGATVMLNILIAGPTTGASMNPNVRTLGPAAANNYKAIWVYLTAPILGALCGAGIYSAVKLPEED	DGG								
<i>Bpe</i> NIP7;1	WVELIATFIIMFLAASVTYQHQ--SVGHLSGFVVGIAISLAV----PVSGGSMNP	ARSLGPAIISGKFNDIWIYMTAPTIGAVAGALLFRILRLQQRRC								

	310	320
<i>GmNOD2</i> ;6	ETTKS-ASF-LKGRAASK-	
<i>AtTIP2</i> ;1	PLASADF-----	
<i>AtTIP2</i> ;3	ETREIRV-----	
<i>TaTIP2</i> ;1	SVAGNDY-----	
<i>TaTIP2</i> ;2	SVAGNDY-----	
<i>BpeNIP1</i> ;1	HLPRSTGSF-LRL-----	
<i>BpeNIP4</i> ;1	ELTKS-GSF-LKTCPKNGF-	
<i>BpeNIP1</i> ;2	EITKS-GSF-LKASRNNNSV	
<i>BpeNIP2</i> ;1	PMSKEGHSKEMVNKYPNNSV	
<i>BpeNIP5</i> ;1	--EAPRQVRSFRR-----	
<i>BpeNIP5</i> ;2	--EGQDN-----	
<i>BpeNIP6</i> ;1	IHEKPSTTSSFRR-----	
<i>BpeNIP7</i> ;1	NPTS-----	

Boric Acid Transporters

PIP1

10 20 30 40 50 60 70 80 90 100

HvPIP1;3 MEGKEEDVRLGANRYSEHQPIGTAAQGGGADEKDYKEPPAPFFFEAGELTSWSFYRAGIAEFLATFLFLYISVLTVMGVGNPSGSKCGTVGIQGIAWSF
HvPIP1;4 MEGKEEDVRLGANRYSERQPIGTAAQGGGADEKDYKEPPAPLFEEELSSWSFYRAGIAEFLATFLFLYISVLTVMGVGNPSGSKCGTVGIQGIAWSF
ZmPIP1;1 MEGKEEDVRLGANKFSEHAI GTAAQGTD--DKDYKEPPAPLFEPEGELKSWSFYRPGIAEFVATFLFLYISILTVMGVSKSTS--KCATVGIQGIAWSF
OsNIP2;1 MASNNSRTNSRANYSNEI HDLST-VQNGTMTPTMYGKAIADFFPPHLL-----KKVVSEVVATFLLVFMT-CGAAGISGSD----LSRISQLGQSIAG
BpePIP1;1 MEGKDEDVRLGANRYRERQPIGTAAQSQD-T-KDYQEPPAAPFFEPGELSSWSFYRAGIAEFVATFLFLYITVLTVMGVSKSPS--KCSTVGIQGIAWAF
BpePIP1;2 MEGKEEDVRLGANKYTERQPLGTAAQTD---KDYKEPPAPLFEPEGELCSWSFYRAGIAEFVATFLFLYITVLTVMGVKRSSS--VCASVGIQGIAWAF
BpePIP1;3 MEGKEEDVRLGANKFPERQPIGTAAQSQD-EGKDYIEPPAPLFEPESELTSWSFYRAGIAEFVATFLFLYITVLTVMGVAKSPS--KCSTVGIQGIAWAF
BpePIP1;4 MEGKEEDVKVGASKFPERQAIGTSAQTD---KDYKEPPAPLFEPEGELQSWSFWRAGIAEFIATFLFLYITLLTVMGVSRAPS--KCASVGVQGIAWAF

110 120 130 140 150 160 170 180 190 200

HvPIP1;3 GGMIFVLVYCTAGISGGHINPAVTFGLFLARKLSLTRAVFYIVMQCLGAICGAGVVKGFQTTLYQGNGGGANSVAAGYTKGDGLGAEIVGTFVLVYTVFS
HvPIP1;4 GGMIFVLVYCTAGISGGHINPAVTFGLFLARKLSLTRAVFYIVMQCLGAICGAGVVKGFQTTLYQGNGGGANSVAAGYTKGDGLGAEIVGTFVLVYTVFS
ZmPIP1;1 GGMILALVYCTAGISG-HINPAVTFGLFLARKLSLTRAVFYIIMQCLGAICGRGVVKGFQQGLYMGNGGRRNVVAPGYTKGDGLGAEIVGTFILVYTVFS
OsNIP2;1 GLIVTVMIIYAVGHISGAHMNPAVTLAFAVFRHFPWQVPPFYWAAQFTGAICASFVLKAVIHPVDVI--GTTTPVGPHW---HSLVVEVIVTFNMMFVTLA
BpePIP1;1 GGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAVFYIVMQCLGAICGAGVVKGFQKNQYERLGGGANTISSGYSKGDGLGAEIVGTFVLVYTVFS
BpePIP1;2 GGMIFALVYCTAGISGGHINPAVTFGLLLARKLSLTRAVFYIIMQCLGAICGAGVVKGFQKTPFEINGGGANVVNHGYTKGDGLGAEIVGTFVLVYTVFS
BpePIP1;3 GGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRALFYIVMQCLGAICGAGVVKGFQKSQYEILGGGANFVNPGYTKGDGLGAEIVGTFVLVYTVFS
BpePIP1;4 GGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRALFYIVMQCLGAICGAGVVKGFQKTQYERVGGGANVVNHGYSKGDGLGAEIVGTFVLVYTVFS

210 220 230 240 250 260 270 280 290 300

HvPIP1;3 ATDAKRSARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI IYNKKQAWDDHWIFWVGPFIGAALAA-IYHVVVIRAI PFKSRGIGAALA//
HvPIP1;4 ATDAKRSARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI IYNKKQAWDDHWIFWVGPFIGAALAA-IYHVVVIRAI PFKSRDIGAALA//
ZmPIP1;1 ATDAKRRARDSHVPILAPLPIGFAVFLVHLATMGITGTGINPARSLGAAV IYNQHAWADHWIFWVGPFIGAALAA-IYHQVIRAI PFKSRS-----
OsNIP2;1 VATDTRAVGE-----LAGLAVGSAVCITSIFAGAISGGSMNPARTLGPALASNK---FDGLWIFYLGPVMTGLSGAWTYTFIRFEDTPKEGSSQKLSSF//
BpePIP1;1 ATDAKRNARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI IYNKEQAWNNHWIFWVGPFIGAALAA-LYHQIVIRAI PFKSK-----
BpePIP1;2 ATDAKRNARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI IYNKDHWADHWIFWVGPFIGAALAA-VYHQIVIRAI PFKARG-----
BpePIP1;3 ATDAKRSARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI IYNRDRADDDHWIFWVGPFIGAALAA-LYHQVVIRAI PFKSK-----
BpePIP1;4 ATDAKRNARDSHVPILLAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI IYNKDHWADDDQWIFWVGPFIGAALAA-LYHQIVIRAMP FKTRA-----

NIP

	110	120	130	140	150	160	170	180	190	200
<i>Hv</i> PIP1;3	SGSKCGTVGIQGI	AWSF	GGMIFVLVYCTAGIS	GGHINPAVTFGLFLARKLSL	TRAVFYIVMQCLGAICGAGVVKG	FQTTLYQGN	GGGANSVAAGYTKGDG			
<i>Hv</i> PIP1;4	SGSKCGTVGIQGI	AWSF	GGMIFVLVYCTAGIS	GGHINPAVTFGLFLARKLSL	TRAVFYIVMQCLGAICGAGVVKG	FQTTLYQGN	GGGANSVAAGYTKGDG			
<i>Zm</i> PIP1;1	STSKCATVGIQGI	AWSF	GGMILALVYCTAGIS	G-HINPAVTFGLFLARKLSL	TRAVFYIIMQCLGAICGRGVVKG	FQQGLYMGN	GGRRNVVAPGYTKGDG			
<i>Os</i> NIP2;1	GSDL-SRISQLGQSI	AGGLIVTVM	IYAVGHI	SGAHMNP	AVTLAFAVFRHFPW	IQVPFYWAAQFTGAICASFVLKA	----VIH-PVDVIGTTTPV	GPHWHS		
<i>Bpe</i> NIP1;1	KIYG-SV-TFPGICV	TWGLIVTVM	IYTVGHI	SGAHFNPAVTITSAIFRRFPYKEV	PLYIAAQLMGSILASGTLAL	----VFDVTPDAYFGTVPTGS	NSQS			
<i>Bpe</i> NIP1;2	LGND-KVV	TAPGVSIVWGLAVMVLVYSV	GHISGAHFNPAVTIAFATCRRFPWKQVPAYVSAQVLGSTMASGTLRL	----IFNGHENRFVGTIPAGS	NLQS					
<i>Bpe</i> NIP2;1	AAD	E-NKVS	KLAASVAGGLIVTVM	IYAVGHI	SGAHMNP	AVTLAFAAVRHFPWKQVPLYAAAQLAGAI	SAAFTLRV----ILN-PIKELGTTSP	TGTEIEA		
<i>Bpe</i> NIP4;1	KIYG-SV-SFP	GCIVWGLIVMVM	IYSVGHISGAHFNPAVTITFAIFRRFP	LKQVPLYIVAQMIGSTLASATLCA	----LFPVDKKSFFGTAPVGS	NFQA				
<i>Bpe</i> NIP5;1	QKYN-GAES	LIGNAACAGLAVM	VVLSTGHISGAHLNPSLTIAFATLRHFPWLQVPAYIAAQVSGSICASFAL	KG----VFH-PYMSGGVTVPSVTEGQA						
<i>Bpe</i> NIP5;2	EKYQ-GAET	LIGSAACAGLAVMAMVLSTGHISGAHFNPSVTIAFAALRHFPWVQVPGYLVAQVSASICA	AAFTLKG----VFH-PFMSGGVTVPAVGIGQA							
<i>Bpe</i> NIP6;1	QKTH-GSET	LLGCAASSGLAVM	VVLSTGHISGAHLNPALTIAFAALKHFPWKHVP	PMYIGAQVVASFCAAFAL	KG----IFH-PIMGGGVTVPSGSYGQA					
<i>Bpe</i> NIP7;1	QLSK-GEV	GLLEYAATAGLTVVVVIFSIGHISCAHVNPAVTIAFATFGHFPWSKVPLYILAQT	LGSVLATCIGQS----VYD-VKSEFMTTRPLRGCSSA							
	210	220	230	240	250	260	270	280	290	300
<i>Hv</i> PIP1;3	LGAEIVGTFVLVYTVFSATDAKRSARD	SHVPILAPLP	IGFAVFLVHLATIPITGTGINPARSLGAAIIYNKKQAWDDHWIFWVGPF	IGAALAA-IYHV	VV					
<i>Hv</i> PIP1;4	LGAEIVGTFVLVYTVFSATDAKRSARD	SHVPILAPLP	IGFAVFLVHLATIPITGTGINPARSLGAAIIYNKKQAWDDHWIFWVGPF	IGAALAA-IYHV	VV					
<i>Zm</i> PIP1;1	LGAEIVGTFILVYTVFSATDAKRRARD	SHVPILAPLP	IGFAVFLVHLATMGITGTGINPARSLGAAVIYNQHHAWADHWIFWVGPF	IGAALAA-IYHQVI						
<i>Os</i> NIP2;1	LVVEVIVTFNMMFVTLAVATDTRAVGE	-----LAGLAVGS	AVCITSIFAGAI	SGGSMNPARTLGPALASNK	----FDGLW	IYFLGPVMGTL	SGAWTYTFIR			
<i>Bpe</i> NIP1;1	LVLEILCSFLLMFVISGVT	TDRAISE-----VAGIAVG	MTILLNVFIAGPVSGAS	MNPARSIRPAVIKHV---YKGLW	VYIVGP	IIIGTIAGAFAYN	LIR			
<i>Bpe</i> NIP1;2	FALEFIITFYLMFVISG	VATDNRAIGE-----LAGLAVG	STILLNVMFAGPISGAS	MNPARS	LGPAIVHNK---YESIW	VYLVATTLGAIAGGMVYN	IIR			
<i>Bpe</i> NIP2;1	LVMEIVVTF	TMMFTASAVATDTKAIGE-----LAGLAVG	SAVCITSILAGPISG	SMNPARTIGPAIASAS---YKGIW	VYLVGPV	TGTLGAWSYKLIR				
<i>Bpe</i> NIP4;1	LIIEIIISFLLMFVICG	VATDNRAIGE-----LAGIAVG	MTITLNVFVAGPVSGAS	MNPARSIGPALLTHM---YKGLW	IYILG	PLAGTILGGFAYNMIR				
<i>Bpe</i> NIP5;1	FALEFIITFNLLFVV	TAVATDTRAVGE-----LAGIAVG	ATVLVNILVAGPSSG	SMNPVRTLGPAIAAGN---YKSLW	IYLVAPT	LGALTGAGVYTAVK				
<i>Bpe</i> NIP5;2	FALEFIVTFTLLFVIT	AVATDCAVGE-----FAGIAIG	GTVMNLIVAGTTTGAS	MNPVRTIGPAIAAGT---YKGF	WIYMVAPILGALAGAGTYTFVK					
<i>Bpe</i> NIP6;1	FALEFIISFNLMFVV	TAVATDTRAVGE-----LAGIAVG	ATVMNLIVAGPTTGAS	MNPVRTLGPAVAANN---YKAIW	VYLTAPILGALCGAGIYSAVK					
<i>Bpe</i> NIP7;1	FWVELIATFIIMFLAAS	VTYQHQS	VGH-----LSGFVVGIAISL	-----AVPVSGG	SMNPARS	LGPAIISGK---FNDIWIYMTAPTIGAVAGALLFRILR				

CO₂ Transporters

PIP1

	10	20	30	40	50	60	70	80	90	100
AtPIP12	-MEGKEEDVRVGANKFPERQPIGTSAQSD---	KDYKEPPPAPLFEPGELASWSFWRAGIAEF	IATFLFLYITVLTVMGVKRSPNM-----	CASVGIQ						
NtAQP1	MAENKEEDVKLGANKFRETQPLGTAAQTD---	KDYKEPPPAPLFEPGELSSWSFYRAGIAEF	MATFLFLYITILTVMGLKRSDSL-----	CSSVGIQ						
BpePIP11	-MEGKDEDVRLGANRYRERQPIGTAAQSQDT-	KDYQEPPAAPFFEPGELSSWSFYRAGIAEF	VATFLFLYITVLTVMGVSKSPSK-----	CSTVGIQ						
BpePIP13	-MEGKEEDVRLGANKFPERQPIGTAAQSQDEG	KDYIEPPPAPLFEPSELTSWSFYRAGIAEF	VATFLFLYITVLTVMGVAKSPSK-----	CSTVGIQ						
BpePIP12	-MEGKEEDVRLGANKYTERQPLGTAAQTD---	KDYKEPPPAPLFEPGELCSWSFYRAGIAEF	VATFLFLYITVLTVMGVKRSSSV-----	CASVGIQ						
BpePIP14	-MEGKEEDVKVGASKFPERQAIGTSAQTD---	KDYKEPPPAPLFEPGELQWSFWRAGIAEF	IATFLFLYITLLTVMGVSRAPSK-----	CASVGVQ						
HvPIP2_1	-----MAKDIEAAPQGGEFSSKDYS	SDPPPAPIVDFEELTKWSLYRAVIAEF	VATLLFLYITVATVIGYKHQSDPTVNTT	DAACSGVGTL						
BpePIP21	-----MSKEVSEEGQSHQ-HGKDYVD	PPAPLLDLAELKLWSFYRSLIAEF	IATLLFLYITVATVIGHKKATGP-----	CDGVGLL						
BpePIP22	-----MSKEVTEEREASQ-PVKDYVD	PPATPLFDVAEFTMWSFYRAVIAEF	AALLFLYITVATVIGYKKQTD-----	CETVGLL						
BpePIP23	-----MSKEVTEEAASQ-PVRDYVD	PPAPLFDVEELTEWSFYRAVIAEF	IATLLFLYITVATVIGYKKQNDQ-----	CETVGLL						
BpePIP24	-----MAKDAEVPEH-GSFTAKDYH	DPAPLFDVELTKWSFYRALIAEF	IATLLFLYITVLTVIGYKSQIDPANDGEA--	CGGVGVL						
BpePIP25	-----MAKDVEVAEHQGEYS	AKDYHDPAPLIDYDELIKWSFYRALIAEF	IATLLFLYITVLTVIGYKSQTDPSKNPDQ--	CGGVGIL						
BpePIP26	-----MAKDMEVGGQSG-FSAKDYH	DPAPLIDAEELTKWSFYRAIIAEF	IATLLFLYITVLTVIGYRAQSDTTRGGDD--	CGGVGIL						
	110	120	130	140	150	160	170	180	190	200
AtPIP12	GIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSL	TRAVYYIVMQCLGAICGAGVVKG	FQPKQYQALGGGANTIAHGYTKG	SGLGAEIIGTFVL						
NtAQP1	GVAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSL	TRAFYIVMQCLGAICGAGVVKG	FQKQYERLGGGANTISSGYSKGD	GLGAEIIGTFVL						
BpePIP11	GIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSL	TRAFYIVMQCLGAICGAGVVKG	FQKNQYERLGGGANTISSGYSKGD	GLGAEIVGTFVL						
BpePIP13	GIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSL	TRAFYIVMQCLGAICGAGVVKG	FQKSQYERLGGGANFVNP	PGYTKGDGLGAEIVGTFVL						
BpePIP12	GIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSL	TRAFYIIMQCLGAICGAGVVKG	FQKTPFEINGGANVNVNHGYTKGD	GLGAEIVGTFVL						
BpePIP14	GIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSL	TRAFYIVMQCLGAICGAGVVKG	FQKTQYERVGGGANVNVNHGYSKGD	GLGAEIVGTFVL						
HvPIP2_1	GIAWAFGGMIFVLVYCTAGVSGGHINPAVTFGLFLARKVSL	LIRALLYIIAQCLGACGVGLVK	GFQSSYYVRYGGGANELSAGYSKGT	GLAAEIIIGTFVL						
BpePIP21	GIAWAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSL	LIRAVSYMVAQCLGAICGVGLVK	AFMKHDYNMQGGGANSVSP	PGYSTGTALGAEIIGTFVL						
BpePIP22	GVAWAFGGMIFVLVYSTAGISGGHINPAVTFGLFLARKVSL	LIRACYMVAQCLGAICGAGLVK	GIMKDSYDAFGGGTNTVSP	TYSKGTALGAEIIGTFVL						
BpePIP23	GVAWAFGGMIFILVYSTAGISGGHINPAVTFGLFLARKVSL	LIRACYMVAQCLGAICGAGLVK	GIMKDYYDALGGGTNTVSP	TYNKGTALGAEIIGTFVL						
BpePIP24	GIAWAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSL	VRASYMVAQCLGAISGVGLVK	AFNKAHYTRYGGGANTLADGYST	GVGLGAEIIGTFVL						
BpePIP25	GIAWAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSL	LIRALLYMVAQCLGAICGVGLVK	AFQKSDYNRYGGGANELSVGYNK	GVGLGAEIIGTFVL						
BpePIP26	GIALAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSL	VRALLYMVAQCLGAICGGLVK	AFQRAHYTRYGGGANELSVGYSKGT	GLAAEIIIGTFVL						

210 220 230 240 250 260 270 280 290 300 310 320

AtPIP12 VYTVFSATDAKRNARDSHVPIILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAIIFNKD~~NAWDDHW~~VFWVGPFIGAALAALYHVIVIRAIPFKSRS--

NtAQP1 VYTVFSATDAKRNARDSYVPIILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI~~IYNTDQAWDDHW~~IFWVGPFIGAALAAYVHQIIIRAIPFHKSS--

BpePIP11 VYTVFSATDAKRNARDSHVPIILAPLPIGFAVFLVHLATIPITGTGINPARSLGAALIFNKEQ~~AWHNH~~IFWVGPFIGAALAALYHQIVIRAIPFKSK---

BpePIP13 VYTVFSATDAKRSARDSHVPIILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI~~IYNRDRAWDDHW~~IFWVGPFIGAALAALYHQVVIRAIPFKSK---

BpePIP12 VYTVFSATDAKRNARDSHVPIILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI~~IYNKDHAWDDHW~~IFWVGPFIGAALAAYVHQIVIRAIPFKARG--

BpePIP14 VYTVFSATDAKRNARDSHVPLLAPLPIGFAVFLVHLATIPITGTGINPARSLGAAI~~IYNKDHAWDDQW~~IFWVGPFIGAALAALYHQIVIRAMPFKTRA--

HvPIP2_1 VYTVFSATDPKRNARDSHIPVLAPLPIGFAVFMVHLATIPITGTGINPARSLGA~~AVIYNTDKAWDDQW~~IFWVGPLIGAAIAAAYHQYVLRASAAK-LGSY //

BpePIP21 VYTVFSATDPKRSARDSHVPLAPLPIGFAVFMVHLATIPITGTGINPARSLGA~~AVIYNNKGIWDDQW~~IFWVGPFV~~GAL~~AAAAHYHQYILRAAAIKALGSF //

BpePIP22 VYTVFTATDPKRNARDSYVPLAPLPIGFAVFMVHLATIPITGTGINPARSFG~~VAVIYNNDKVWDDQW~~IFWAGPFAGALAAALYYQFILRATAMKALGSF //

BpePIP23 VYTVFSATDPKRRKARDSHVPLAPLPIGFAVFMVHLATIPITGTGINPARSFG~~AAVIYNNDKVWDDQW~~IFWVGPFAGALAAALYHQHILRATAIKALGSF //

BpePIP24 VYTVFSATDPKRNARDSHVPLAPLPIGFAVFMVHLATIPITGTGINPARSFG~~AAIYNNKAKAWDDQW~~IFWVGPFAGALAAAFYHQFILRAGAIAKALGSF //

BpePIP25 VYTVFSATDPKRSARDSHVPLAPLPIGFAVFMVHLATIPITGTGINPARSFG~~AAVIYNNDKAWDDQW~~IFWVGPFIGAAIAAFYHQFILRAGAIAKALGSF //

BpePIP26 VYTVFSATDPKRSARDSHVPLAPLPIGFAVFMVHLATIPITGTGINPARSFG~~AAVMYKTKAWDDQW~~IFWVGPFIGAAIAAFYHQFILRAGAIAKALGSF //

H₂O₂ Transporters

PIP2

110 120 130 140 150 160 170 180 190 200

AtPIP2;1 WAFGGMIFILVYCTAGISGGHINPAVTFGLFLARKVSLPRALLYIIAQCLGAICGVGVFKAFQSSYYTRYGGGANSLADGYSTGTGLAAEIIIGTFVLVYT

AtPIP2;4 WAFGGMIFVLVYCTAGISGGHINPAVTVGLFLARKVSLVRTVLYIVAQCLGAICGCGFVKAFQSSYYTRYGGGANELADGYNKGTGLGAEIIIGTFVLVYT

AtNIP1;2 IVWGLTVMVLVYSLGHISGAHFNPAVTIAFASCGRFPLKQVPAYVISQVIGSTLAAATLRLFLGLDQDVCSGKHDVFVGTLPSGSNLQSFVIEFIIITFYL

AtTIP1;1 VAHAFGLFVAVSVGANISGGHVNPAVTFGAFIGGNITLLRGILYWIAQLLGSVVAACLILKFATGGLAVPAFG----LSAGVGVNLNAFVFEIVMTFGLVYT

AtTIP1;2 LAHAFGLFVAVSVGANISGGHVNPAVTFGVLLGGNITLLRGILYWIAQLLGSVAACFLLSFATGGEPPIPAFG----LSAGVGSNLNALVFEIVMTFGLVYT

AtTIP2;3 IAHAFALFVGVSIAANISGGHLNPAVTLGLAIGGNITLITGFFYWIAQCLGSIVACLILLVFVTNGKSVPTHG----VSAGLGAVEGVVMEIVVTFALVYT

BpePIP1;1 WAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAIFYIVMQCLGAICGAGVVKGFQKNQYERLGGGANTISSGYSKGDGLGAEIVGTFVLVYT

BpePIP1;2 WAFGGMIFALVYCTAGISGGHINPAVTFGLLLARKLSLTRAIFYIIMQCLGAICGAGVVKGFQKTPFEINGGGANVNVNHGYTKGDGLGAEIVGTFVLVYT

BpePIP1;3 WAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRALFYIVMQCLGAICGAGVVKGFQKSQYEILGGGANFVNPNGYTKGDGLGAEIVGTFVLVYT

BpePIP1;4 WAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRALFYIVMQCLGAICGAGVVKGFQKTQYERVGGGANVNVNHGYSKGDGLGAEIVGTFVLVYT

BpePIP2;1 WAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLIRAVSYMVAQCLGAICGVGLVKAFMKHDYNDMQGGGANVSPPGYSTGTALGAEIIIGTFVLVYT

BpePIP2;2 WAFGGMIFVLVYSTAGISGGHINPAVTFGLFLARKVSLIRAI CYMVAQCLGAICGAGLVKGIKMDYSYDALGGGTNTVSPSTYSGKTALGAEIIIGTFVLVYT

BpePIP2;3 WAFGGMIFILVYSTAGISGGHINPAVTFGLFLARKVSLIRAI CYMVAQCLGAICGAGLVKGIKMDYYDALGGGTNTVSPSTYNGKTALGAEIIIGTFVLVYT

BpePIP2;4 WAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLVRAVSYMVAQCLGAISGVGLVKAFNKAHYTRYGGGANTLADGYSTGVGLGAEIIIGTFVLVYT

BpePIP2;5
BpePIP2;6

WAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLIRALLYMVAQCLGAICGVGLVKAFQKSDYNRYGGGANELSVGYNKGVGLGAEIIGTFVLVYT
LAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLVRAILYMVAQCLGAICGCGLVKAFQRAHYTRYGGGANELSVGYSKGTGLAAEIIIGTFVLVYT

	210	220	230	240	250	260	270	280	290	300
AtPIP2;1	VFSATDPKRSARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSFGAAVIYNKSKPWDD	HWIFWVGPF	FIGAAIAAFYHQFVLRA	----	SGSKSLGS				
AtPIP2;4	VFSATDPKRNARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSFGAAVIYNNEKAWDD	QWIFWVGPM	IGAAAAAFYHQFILRA	----	AAIKALGS				
AtNIP1;2	MFVISGVATDNRA--IGELAGLAV	GSTVLLNVIIAGPVSGASMNPG	RSILGPAMVYS	----	CYRGLWIIYIVSP	IVGAVSGAWVYNMVR	YTDKPLREITKSGS			
AtNIP1;1	VYATA---IDPKNGSLGTIAPIA	IGFIVGANILAGGAFSGASMNPA	VAFGPAVVS	----	TWTNHWVYIWAGPL	VGGGIAGLIYEVFFIN	-TTHEQLPTTDY			
AtTIP1;2	VYATA---VDPKNGSLGTIAPIA	IGFIVGANILAGGAFSGASMNPA	VAFGPAVVS	----	TWTNHWVYIWAGPL	VGGGIAGLIYDFVFIDENA	HEQLPTTDY			
AtTIP2;3	VYATA---ADPKKGS	LTGIIAPIAIGFIVGANILAAGPF	SGGSMNPARSFGPAVVS	SG	----	DLSQIWIYIWVG	PLVGGALAGLIYGDVFIG	---	SYEAVETREI	
BpePIP1;1	VFSATDAKRNARDSHVPILAPLP	IGFAVFLVHLATIPITGTGINPARSLGAALIFNKEQ	AWHNHWIFWVGPF	FIGAALAALYHQIVIRA	----	IPFKSK--				
BpePIP1;2	VFSATDAKRNARDSHVPILAPLP	IGFAVFLVHLATIPITGTGINPARSLGAALIIYNKD	HAWDDHWIFWVGPF	FIGAALAAYVHQIVIRA	----	IPFKARG-				
BpePIP1;3	VFSATDAKRSARDSHVPILAPLP	IGFAVFLVHLATIPITGTGINPARSLGAALIIYNR	DRAWDDHWIFWVGPF	FIGAALAALYHQVVIRA	----	IPFKSK--				
BpePIP1;4	VFSATDAKRNARDSHVPILLAPLP	IGFAVFLVHLATIPITGTGINPARSLGAALIIYNKD	HAWDDQWIFWVGPF	FIGAALAALYHQIVIRA	----	MPFKTRA-				
BpePIP2;1	VFSATDPKRSARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSLGAAVIYNNG	KIWDDQWIFWVGPF	VGALAAAAYHQYILRA	----	AAIKALGS				
BpePIP2;2	VFTATDPKRNARDSYVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSFGVAVIYNND	KVWDDQWIFWAGPF	FAGALAAALYYQFILRA	----	TAMKALGS				
BpePIP2;3	VFSATDPKRKARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSFGAAVIYNND	KVWDDQWIFWVGPF	FAGALAAALYHQHILRA	----	TAIKALGS				
BpePIP2;4	VFSATDPKRNARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSLGAALIIYNK	AKAWDDQWIFWVGPF	FIGAAIAAFYHQFILRA	----	GAAKALGS				
BpePIP2;5	VFSATDPKRSARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSFGAAVIYNK	DKAWDDQWIFWVGPF	FIGAAIAAFYHQFILRA	----	GAIKALGS				
BpePIP2;6	VFSATDPKRSARDSHVPVLAPLP	IGFAVFMVHLATIPITGTGINPARSFGAAVMYK	TKAWDDQWIFWVGPF	FIGAAIAAFYHQFILRA	----	GAAKALGS				

TIP & XIP

	110	120	130	140	150	160	170	180	190	200
AtTIP1;2	AHAFGLFVAVSVGANISGGHVNPAVTFGVLLGGNITLLRG	IYWIAQLLGS	VAAACFLLSF	ATGGEP	IPAFGLSAGVGS	LN	-----	ALVF		
AtTIP2;3	AHAFALFVGVSIAANISGGHLNPAVTLGLAIGGNITLITG	FFYWIAQCLGS	IVACLLLVF	VTNGKSVPT	HGVSAGLGAVE	-----	GVVM			
AtPIP2;1	AFGGMIFILVYCTAGISGGHINPAVTFGLFLARKVSLPR	ALLYIIAQCLGAICGVGFVKAF	QSSYYTRYGGGAN	SLADGYSTGT	-----	GLAA				
AtPIP2;4	AFGGMIFVLVYCTAGISGGHINPAVTVGLFLARKVSLVR	TVLYIVAQCLGAICGCGFVKAF	QSSYYTRYGGGAN	ELADGYNKGT	-----	GLGA				
AtNIP1;2	VWGLTVMVLVYSLGHISGAHFNPAVTIAFASCGRFPLK	QVPAYVISQVIGSTLAAATLRL	LFGLDQDVC	SGKHDVFGTLP	SGSN	-----	LQSFVI			
BpeTIP1;1	AHAFGLFVAVSISANISGGHVNPAVTFGAFIGGNITLLR	GIVYWIAQLLGSTVACLL	LKFATNGLT	TSAFSLSSGVGVWN	-----	AFVL				
BpeTIP1;2	AHGFLFVAVSIGANISGGHVNPAVTFGAFLGGHISLIR	GLLYWVAQLLGSV	VACLLLFSTGG	LET	PAFSLSSDVSVWN	-----	AVVL			
BpeTIP1;3	AHAFALFVAVSVGANISGGHVNPAVTFGAFIGGNITLLR	TILYWIAQLLGSV	VACLLLFATGG	LET	SAFSLSSGVSVWN	-----	AVVF			
BpeTIP2;1	CHGFALFVAVAVGANISGGHVNPAVTFGLALGGQITLL	TGIFYWIAQLLGS	IAACFLLKAVT	-GLAIP	THSVASGVGAIE	-----	GVVM			
BpeTIP2;2	AHAFALFVGVSIAANISGGHLNPAVTFGLALGGNITIL	TGIFYWIAQCLGS	IVACLLLQFV	TNGLSIP	THGVASGMNAVE	-----	GVVM			
BpeTIP3;1	AHAFSLFAAVAASLNISGGHVNPAVTFGTLGGRI	SVLRAVFWIAQLLGAV	VASLLRLVT	TNNMRP	VGFFYVTS	SGVGEWH	-----	GLIF		
BpeTIP4;1	THALVVAVMISAG-HISGGHLNPAVTLGLLAGGHITIF	RSFLYWIDQLLAASAAC	IIILYYITGGL	TTPIH	SLASGVGYLQ	-----	GVIW			
BpeTIP5;1	TNAFALSAAVYVAANISGGHVNPAVTFGMVGGHISV	PALFYWLSQMLASV	MSLLKMT	VVGQHV	PTYVIAEEMT	GFG	-----	ASLM		
BpeXIP2;1*	LIAIITAILLLAANPISGGHMNPVITLAAALVG	VISVSRAAVYILAQCAGAV	LALKA	VNSTIED	TFSLGGCTLT	VIAPGPNGPI	SVGLGTSQGLWL			
BpeXIP1;1	AVFIIAFLFLATIPLSGGHMNPILTFIACLKGLIT	LARASIYVLAQCLGS	IIIGFFIIKNV	MNHQTGHNY	FLGGCTISALNRGT	-----	ALVL			

BpeXIP1;2	AVFIIAFLFLMATAPLSGGHMSPIFTTFIACLKGLITLARASIYVLAQCLGSIIGFFIIKNVMNHQIGHKYFLGGCTISALSRGT-----ALVL
BpeXIP1;3	AVFIIAFLFLMATVPLSGGHMSPIFTTFIACLKGLITLARASMYVLAQCLGSIIGFFIIKNVMNHQTGHKYFLGGCTISTLSRGT-----ALVL
	210 220 230 240 250 260 270 280 290 300
AtPIP2;4	EIIGTFVLVYTVFSATDPKRNARDSHVPVLAPL---PIGFAVFMVHLAT--IPITGTGINPARSFGAAVIYNNEKAWDDQWIFWVGPMIGAAAAAFYHQF
AtTIP23	EIVVTFALVYTVYATAADPKKG-----SLGTIAPIAIGFIVGANILAAG--PFSGGSMNPARSFGPVAVSGD---LSQIWIYWVGPLVGGALAGLIYGD
AtNIP1;2	EFIITFYLMFVISGVATDNR-----AIGELAGLAVGSTVLLNVIIAG--PVSGASMNPGRSLGPAMVYSC---YRGLWIYIVSPIVGAVSGAWVYNM
AtTIP11	EIVMTFGLVYTVYATAIDPKNG-----SLGTIAPIAIGFIVGANILAGG--AFSGASMNPVAFGPVAVSWT---WTNHWVYWAGPLVGGGIAGLIYEV
AtTIP12	EIVMTFGLVYTVYATAVDPKNG-----SLGTIAPIAIGFIVGANILAGG--AFSGASMNPVAFGPVAVSWT---WTNHWVYWAGPLIGGGLAGLIYDF
BpeTIP1;1	EIVMTFGLVYTVYATAVDPKRG-----SVGVIAPIAIGFIVGANILAGG--AFDGASMNPVAVSFGPALVSWT---WENHWVYWAGPLIGGGLAGLVYEF
BpeTIP1;2	EIVMTFGLVYTVYATAVDPKKG-----NIGILAPIAIGLIVGANILAGG--AFDGASMNPVAVSFGPAVVSWs---WDNHWVYWVGPLIGSAIAAIVYEL
BpeTIP1;3	EIVMTFGLVYTVYATAVDPKKG-----NVGTVAPIAIGFIVGANILVGG--AFDGASMNPVAVSFGPAVVSWs---WTNHWVYWLGPVGAIAAIVYDT
BpeTIP2;1	EIIITFALVYTVYATAADPKKG-----SLGTIAPIAIGFIVGANILAAG--PFSGGSMNPARSFGPVAVSGD---FHDNWIYWAGPLVGGGLAGLIYGN
BpeTIP2;2	EIVITFALVYTVYATAADPKKG-----SLGIIAPIAIGFIVGANILAAG--PFSGGSMNPARSFGPVAVSGD---FSQNWIIYWVGPLIGGGLAGLVYGG
BpeTIP3;1	EIVMTFTLVYTVFATAIDPKRG-----SLGTIAPLAIGFIVGANILAGG--PFDGACMNPVAFGPALVGWR---WRNHWIYWVGPLIGGGLAGLVYFY
BpeTIP4;1	EVILTFSLFTVYATIVDPKKG-----ALDGLGPTLTGFVVGANILAGG--AFSGASMNPVAVSFGPALISGD---WTDHWVYWVGPLIGGGLAGFIYEN
BpeTIP5;1	EGVLTFALVYTVYA-AGDTRRG-----TMGAIGPIAIGSIAGANVLAAG--PFSGGSMNPACAFGSAVTAGS---FKNQAVYWVGPLIGAAAAGLVYDN
BpeXIP2;1*	EIICTFVLLFASIWIALDHRQARALGRVIFSVIGIVVGLLVFVSTTVTGAKGYAGAGMNPVAVSFGPALISGD---WNGHWVFWAGPSIASVAFYLYTKI
BpeXIP1;1	EFCCTFVLLFVGVTVAFDKKRCKELGLAVVCAVVAAAWALAVFVSITVTGQVGYAGVGLNPARCLGPALLHGGVL-WDGHVWVFWGPFACIVYYGYSMS
BpeXIP1;2	EFCCTFVVLVVGVTVAFDKKRCKELGLAVVCVVVAGAMALAVFVSITVTGQASYAGVGLNPARCLGPVLLQGGVL-WDGHVWLWVGPFACIVYYGYSMN
BpeXIP1;3	EFCCTFVVLVVGVTVAFDKKRCKELGVAVVCVVVAGAMALAVFVSITVTGQAGYAGVGLNPARCLGPALLQGGVL-WDGHVWVFWGPFACIVYYGYSMN

Silicic Acid Transporters

NIP

10 20 30 40 50 60 70 80 90 100

HvNIP2;1 -MASNSRSNSRATFSSEIHDIGTVQNSTTPSMVYYTERSIA DYFP PHL LKKVVSEVVSTFLLVFVTCGAAAISAHDVTRISQLGQSVAGGLIVVMIYAV
ZmNIP2;1 -MSTNSRSNSRANFNNEIHDIGTAQNSSMPPT--YY-DRSLADIF P PHL LKKVVSEVVSTFLLVFVTCGAAGIYGSDKDRI SQLGQSVAGGLIVTVMYIYAV
OsNIP2;1 MASNNSRTNSRANYSNEI HDLSTVQNGTMPTM--YYGEKAIADFF P PHL LKKVVSEVVATFLLVFMT CGAAGISGSDLRSISQLGQSIAGGLIVTVMYIYAV
BpeNIP2;1 -MATDPKPKNLAEANEVFSLENPI SRKPKPGLL--RALLEEHYP PGFLSKVVAETIATYLLVFVTCGSAALSAADENKVKSLAASVAGGLIVTVMYIYAV

110 120 130 140 150 160 170 180 190 200

HvNIP2;1 GHISGAHMNP AVTLAFAIFRHFPWIQVPFYWAAQFTGAICASFVLKAVLHPITVIGTTPEVGP HWHALVIEVVVTFNMMFVTLAVATDTRAVGELAGLAV
ZmNIP2;1 GHISGAHMNP AVTLAFAVFRHFPWIQVPFYWAAQFTGSICASFVLKAVLHP IAVLGTTTPTGPHWHS LVIEIIVTFNMMFVTLAVATDTRAVGELAGLAV
OsNIP2;1 GHISGAHMNP AVTLAFAVFRHFPWIQVPFYWAAQFTGAICASFVLKAVIHPVDVIGTTTTPVGP HWHSLVVEVIVTFNMMFVTLAVATDTRAVGELAGLAV
BpeNIP2;1 GHISGAHMNP AVTLAFAAVRHF PWKQVPLYAAAQLAGAISAAFTLRVILNPIKELGTTSP TGTEIEALVMEIVVTF TMFTASAVATDTKAIGELAGLAV

210 220 230 240 250 260 270 280 290 300

HvNIP2;1 GSAVCITSIFAGAVSGGSMNPARTLGPALASNLYTGLWLWYFLGPVLGTL SGAWTYTYIRFEDPP--KDAPQKLSSF KLRRLQSQ-SVAADD-DELDHIPV
ZmNIP2;1 GSAVCITSIFAGAVSGGSMNPARTLGPALASNLYTGLWYIYFLGPVLGTL SGAWTYTYIRFEEAPSHKDMSQKLSSF KLRRLQSQ-SVAVDD-DELDHIQV
OsNIP2;1 GSAVCITSIFAGAISSGSMNPARTLGPALASNKFDGLWYIYFLGPVMGTL SGAWTYTFIRFEDTPK-EGSSQKLSSF KLRRLRSQQSIAADDVDEMENIQV
BpeNIP2;1 GSAVCITSILAGPISGGSMNPARTIGPAIASASYKGIWVYLVGPVVTGTL LGAWSYKLIRVSD EPLYPMSKEGHSKEMVNKYPNN-SV-----

PIP1 & PIP2

	110	120	130	140	150	160	170	180	190	200
<i>NtAQP1</i>	TVMGLKRSDSL-----CSSVGIQGVAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAIFYIVMQCLGAICGAGVVKGMVGPYQRLGGG									
<i>NtTIPa</i>	SAMAANKLNGD-----AMAHALVVAVTISAGFRISGGHINPAVTLGLCMGGHITVFRSILYWIDQLLASVAACALLNYLTAG----LETP									
<i>AtTIP4;1</i>	SAMATDSLNG-----TLVGLFAVAVAHAFVAVMISAG-HISGGHINPAVTLGLLLGGHISVFRFLYWIDQLLASSAACFLLSYLTGG----MGTP									
<i>CpNIP1</i>	AAALNGSDAQR-----VSQLGASVAGGLIVTVMIIYAVGHISGAHMNPAVTTAFATRHFPWKQVPLYAAAQLSGATCAAFTRLRLLLHPIKHLGT--									
<i>AtNIP6;1</i>	TAIVNQKTDGA-----ETLIGCAASAGLAVMIVILSTGHISGAHLNPAVTIAFAALKHFPWKHVPVYIGAQVMASVSAAFALKAVFEPTMSGGV--									
<i>AtNIP2;1</i>	AIAVNAQHNHV-----VTLVGIAVVWGIVIMVLVYCLGHLA-AHFNPVATLALASSQRFPLNQVPAYITVQVIGSTLASATLRLLLFDLNDVCSKK									
<i>BpePIP1;2</i>	TVMGVKRSSSV-----CASVGIQGIAWAFGGMIFALVYCTAGISGGHINPAVTFGLLLARKLSLTRAIFYIIMQCLGAICGAGVVKGFQKTPFEINVG									
<i>BpePIP1;4</i>	TVMGVSRAPSK-----CASVGVQGIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAIFYIIMQCLGAICGAGVVKGFQKTQYERVGG									
<i>BpePIP1;1</i>	TVMGVSKSPSK-----CSTVGIQGIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAIFYIIMQCLGAICGAGVVKGFQKNQYERLGG									
<i>BpePIP1;3</i>	TVMGVAKSPSK-----CSTVGIQGIAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAIFYIIMQCLGAICGAGVVKGFQKSQYEILGG									
<i>BpePIP2;1</i>	TVIGHKKATGP-----CDGVGLLGIAWAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLIRAVSYMVAQCLGAICGVGLVKAFMKHDYNNQGGG									
<i>BpePIP2;2</i>	TVIGYKKQTDQ-----CETVGLLGVAWAFGGMIFVLVYSTAGISGGHINPAVTFGLFLARKVSLIRAICYMVAQCLGAICGAGLVKGIMKDSYDAFGG									
<i>BpePIP2;3</i>	TVIGYKKQNDQ-----CETVGLLGVAWAFGGMIFVLVYSTAGISGGHINPAVTFGLFLARKVSLIRAICYMVAQCLGAICGAGLVKGIMKDYYDALGG									
<i>BpePIP2;4</i>	TVIGYKSQIDPANDGEACGGVGLGIAWAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLVRAVSYMVAQCLGAISGVGLVKAFNKAHYTRYGGG									
<i>BpePIP2;5</i>	TVIGYKSQTDPSKNPDQCGGVGILGIAWAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLIRALLYMVAQCLGAICGVGLVKAFQKSDYNRYGGG									
<i>BpePIP2;6</i>	TVIGYRAQSDTTRGGDDCGGVGILGIALAFGGMIFVLVYCTAGISGGHINPAVTFGLFLARKVSLVRAILYMVAQCLGAICGGLVKAFQRAHYTRYGGG									

	210	220	230	240	250	260	270	280	290	300
<i>NtAQP1</i>	ANV---VNHGYTKGDGLGAEIIGTFVLVYTVFSA-TDAKRNARDSYVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAALIIYNTDQAWDDHWIFWV									
<i>NtTIPa</i>	VHT---LANGVSYQGQIIMEVILTFSLFTVYTTIVDPKKGILEGMGPLLTGLVVGANI-----MAGGPFSGASMPARSFPGPAFVSGI---WTDHWVYVW									
<i>AtTIP4;1</i>	VHT---LASGSYTYQGIWEIILTFSLFTVYATIVDPKKGSLDGFGPLLTGFVVGANI-----LAGGAFSGASMPARSFPGPALVSGN---WTDHWVYVW									
<i>CpNIP1</i>	-----TPPSGSDLQALVMEIVVTFSMMFVTCAVATDTKA-----VGELAGLAVGSAVCITSILAGPVSGGSMNPVRTLGPAASDN---YKGLWVYFV									
<i>AtNIP6;1</i>	-----TVPTVGLSQAFALEFIISFNLMFVVTAVATDTRA-----VGELAGIAGVATVMLNLIAGPATASAMNPVRTLGPAIAANN---YRAIWVYLT									
<i>AtNIP2;1</i>	HDVFLGSSPSGSDLQAFVMEFIITGFLMLVCAVTTTKRT-----TEELEGLIIGATVTLNVIFAGEVSGASMPARSIGPALVWGC---YKGIWIYLL									
<i>BpePIP1;2</i>	ANV---VNHGYTKGDGLGAEIVGTFVLVYTVFSA-TDAKRNARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAALIIYNKDHAWDHWIFWV									
<i>BpePIP1;4</i>	ANV---VNHGYSKGDGLGAEIVGTFVLVYTVFSA-TDAKRNARDSHVPVLLAPLPIGFAVFLVHLATIPITGTGINPARSLGAALIIYNKDHAWDQWIFWV									
<i>BpePIP1;1</i>	ANT---ISSGYSKGDGLGAEIVGTFVLVYTVFSA-TDAKRNARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAALIFNKEQAWHNNHWIFWV									
<i>BpePIP1;3</i>	ANF---VNPGYTKGDGLGAEIVGTFVLVYTVFSA-TDAKRSARDSHVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAALIIYNRDRWDHWIFWV									
<i>BpePIP2;1</i>	ANS---VSPGYSTGTALGAEIIGTFVLVYTVFTA-TDPKRSARDSHVPVLAAPLPIGFAVFMVHLATIPITGTGINPARSLGAALIIYNNKQWDDQWIFWV									
<i>BpePIP2;2</i>	TNT---VSPTYSGKTALGAEIIGTFVLVYTVFTA-TDPKRNARDSYVPVLAAPLPIGFAVFMVHLATIPITGTGINPARSFGVAVIYNNDKVWDDQWIFWA									
<i>BpePIP2;3</i>	TNT---VSPTYNGKTALGAEIIGTFVLVYTVFSA-TDPKRNARDSHVPVLAAPLPIGFAVFMVHLATIPITGTGINPARSFGAAVIYNNDKVWDDQWIFWV									
<i>BpePIP2;4</i>	ANT---LADGYSTGVGLGAEIIGTFVLVYTVFSA-TDPKRNARDSHVPVLAAPLPIGFAVFMVHLATIPITGTGINPARSLGAALIIYNKAKWDDQWLFVW									
<i>BpePIP2;5</i>	ANE---LSVGYNKGVLGAEIIGTFVLVYTVFSA-TDPKRSARDSHVPVLAAPLPIGFAVFMVHLATIPITGTGINPARSFGAAVIYNNDKWDDQWIFWV									
<i>BpePIP2;6</i>	ANE---LSVGYSKGTGLAAEIIIGTFVLVYTVFSA-TDPKRSARDSHVPVLAAPLPIGFAVFMVHLATIPITGTGINPARSFGAAVMYGKTKAWDDQWIFWV									

TIP & XIP

	110	120	130	140	150	160	170	180	190	200																																																																												
<i>CpNIP1</i>	AAALNGSDAQRVS-----	QLGASVAGGLIVT	VMIYAVGHI	SGAHMNP	PAVTTAF	AATRHF	PWKQV	PLYAAA	QLSGATCAAF	TLRLLLHP	IKHLGT-----																																																																											
<i>AtNIP6;1</i>	TAIVNQKTDGAET-----	LIGCAASAGL	VMIVILST	GHI	SGAHLNP	PAVTIA	FALKH	FPWKH	VPVYIGA	QVMASV	SAAFALKAVFEP	TMSSGV-----																																																																										
<i>AtNIP2;1</i>	AIAVNAQHNHVVT-----	LVGI	AVVWGIV	IMVLV	YCLGHL	S-AHFN	PAVT	LALASS	QRFPL	NQVPAYIT	VQVIGSTLAS	ATLRL	FDL	NND	VCSK	KHDVF																																																																						
<i>NtAQP1</i>	TVMGLKRS	DSL	CS	SS	--VGI	QGV	AWAF	GGMIF	ALVY	CTAGIS	GGHIN	PAVT	FG	L	LARK	LSL	TR	AI	FY	I	VMQ	CL	GAIC	GAGV	VKG	FM---V	GPY	QRL	G	GGA																																																								
<i>AtTIP4;1</i>	SAMATDS	LV	GN	TL	V---GL	FAV	AVAH	AFV	V	AVMIS	AG--HIS	GGH	LN	PAVT	L	G	L	L	G	HIS	V	F	RAFL	Y	WID	Q	L	L	A	S	AAC	F	L	S	Y	L	T	G	G	M	G	T	P	VH-----																																										
<i>NtTIPa</i>	SAMAANK	L	NGD	-----	AM	A	H	L	V	V	A	V	T	I	S	A	G	F	RIS	GGH	LN	PAVT	L	G	L	C	M	G	G	HIT	V	F	R	S	I	L	Y	WID	Q	L	L	A	S	V	A	A	C	L	L	N	Y	L	T	A	G	L	E	T	P	VH-----																										
<i>BpeTIP1;1</i>	SGMAFN	K	L	T	D	N	G	S	T	T	P	S	G	L	V	Q	A	A	L	A	H	A	F	G	L	F	V	A	S	I	S	A	NIS	GGH	V	N	PAVT	F	G	A	F	I	G	G	NIT	L	L	R	G	I	V	Y	WIA	Q	L	L	G	S	T	V	A	C	L	L	K	F	A	T	N	G	L	T	T	S	A	F-----										
<i>BpeTIP1;2</i>	SGVAFN	K	L	T	D	N	G	S	T	T	P	A	G	L	V	A	A	L	A	H	A	F	G	L	F	V	A	S	I	S	A	NIS	GGH	V	N	PAVT	F	G	A	F	L	G	G	HIS	L	I	R	G	L	L	Y	W	V	A	Q	L	L	G	S	V	V	A	C	L	L	K	F	S	T	G	G	L	E	T	P	A	F-----									
<i>BpeTIP1;3</i>	SGMAFN	K	L	T	D	N	G	S	T	T	P	S	G	L	V	A	A	L	A	H	A	F	A	L	F	V	A	S	V	G	A	NIS	GGH	V	N	PAVT	F	G	A	F	I	G	G	NIT	L	L	R	T	I	L	Y	WIA	Q	L	L	G	S	V	V	A	C	L	L	K	F	A	T	G	G	L	E	T	S	A	F-----											
<i>BpeTIP3;1</i>	SLLALI	-Y	K	D	T	G	S	T	-P	S	E	L	V	A	I	A	L	A	H	A	F	S	L	F	A	V	A	A	S	L	NIS	GGH	V	N	PAVT	F	G	T	L	L	G	RIS	V	L	R	A	V	F	Y	WIA	Q	L	L	G	A	V	V	A	S	L	L	R	L	V	T	N	N	M	R	P	V	G	F-----													
<i>BpeTIP2;1</i>	SAIAYN	K	L	T	S	N	A	L	D	P	S	G	L	V	GIA	I	C	H	G	F	A	L	F	V	A	V	A	G	A	NIS	GGH	V	N	PAVT	F	G	L	A	L	G	G	QIT	L	T	L	T	G	I	F	Y	WIA	Q	L	L	G	S	I	A	A	C	F	L	K	A	V	T	-G	L	A	I	P	T	H-----													
<i>BpeTIP2;2</i>	SAISY	G	K	L	T	S	D	A	L	D	P	A	G	L	V	A	V	A	H	A	F	A	L	F	V	G	V	S	I	A	A	NIS	GGH	V	N	PAVT	F	G	L	A	L	G	G	NIT	I	L	T	G	I	F	Y	WIA	Q	C	L	G	S	I	V	A	C	L	L	L	Q	F	V	T	N	G	L	S	I	P	T	H-----										
<i>BpeTIP4;1</i>	SAMAAD	K	L	D	S	G	S	L	V---GL	FAV	A	I	T	H	A	L	V	V	A	MIS	AG--HIS	GGH	LN	PAVT	L	G	L	A	G	HIT	I	F	R	S	F	L	Y	WID	Q	L	L	A	A	S	A	C	I	I	L	Y	I	T	G	G	L	T	P	I	H-----																											
<i>BpeTIP5;1</i>	SAMSSR	K	L	M	P	D	V	A	S	D	A	S	S	L	V	V	V	A	I	T	N	A	F	A	L	S	A	A	V	Y	A	A	NIS	GGH	V	N	PAVT	F	G	M	A	V	G	G	HIS	V	P	T	A	L	F	Y	W	L	S	Q	M	L	A	S	V	M	A	S	L	L	K	M	T	V	V	G	H	V	P	T	Y-----									
<i>BpeXIP1;1</i>	SIIACL	D	S	Q	E	V	D	P	K--LL---	V	P	L	A	V	F	I	I	A	F	L	L	A	T	I	P	L	S	G	G	H	M	N	P	I	L	T	F	I	A	C	L	K	G	L	I	T	L	A	R	A	S	I	Y	V	L	A	Q	C	L	G	S	I	I	G	F	F	I	I	K	N	V	M	N	H	Q	T	G	H	N	Y	F	L	G	G	C	T-----
<i>BpeXIP1;2</i>	SIIACL	D	S	H	E	V	D	P	K--LL---	V	P	L	A	V	F	I	I	A	F	L	M	A	T	A	P	L	S	G	G	H	M	S	P	I	F	T	F	I	A	C	L	K	G	L	I	T	L	A	R	A	S	I	Y	V	L	A	Q	C	L	G	S	I	I	G	F	F	I	I	K	N	V	M	N	H	Q	I	G	H	K	Y	F	L	G	G	C	T-----
<i>BpeXIP1;3</i>	SIIACL	D	S	H	E	V	D	P	K--LL---	V	P	L	A	V	F	I	I	A	F	L	M	A	T	V	P	L	S	G	G	H	M	S	P	I	F	T	F	I	A	C	L	K	G	L	I	T	L	A	R	A	S	M	Y	V	L	A	Q	C	L	G	S	I	I	G	F	F	I	I	K	N	V	M	N	H	Q	T	G	H	K	Y	F	L	G	G	C	T-----
<i>BpeXIP2;1</i>	IVISS	F	E	T	K	T	E	S	P	K--LI---	M	S	L	L	I	A	I	T	A	I	L	L	A	N	P	I	S	G	G	H	M	N	P	A	I	T	L	A	A	L	V	G	VIS	V	S	R	A	V	I	L	A	Q	C	A	V	L	G	A	L	K	A	V	N	S	T	I	E	D	T	F	S	L	G	G	C	T-----										
	210	220	230	240	250	260	270	280	290	300																																																																												
<i>CpNIP1</i>	--TTP	S	G	S	D	L-----	Q	A	L	V	M	E	I	V	V	T	F	S	M	F	V	T	C	A	V	A	T	D	T	K--A-----	V	G	E	L	A	G	L	A	V	G	S	A	V	C	I	T	S	I	L	A	G--P	V	S	G	G	S	M	N	P	V	R	T	L	G	P	A	M	A	S	D-----	N															
<i>AtNIP6;1</i>	--TV	P	T	V	G	L	S-----	Q	A	F	A	L	E	F	I	I	S	F	N	L	M	F	V	V	T	A	V	A	T	D	T	R--A-----	V	G	E	L	A	G	I	A	V	G	A	T	V	M	L	N	I	L	I	A	G--P	A	T	S	A	S	M	N	P	V	R	T	L	G	P	A	I	A	A	N-----	N													
<i>AtNIP2;1</i>	L	G	S	S	P	S	G	S	D	L-----	Q	A	F	V	M	E	F	I	I	T	G	F	L	M	V	C	A	V	T	T	T	KR--T-----	T	E	E	L	E	G	L	I	I	G	A	T	V	T	L	N	V	I	F	A	G--E	V	S	G	A	S	M	N	P	A	R	S	I	G	P	A	L	V	W	G---C														
<i>AtTIP4;1</i>	-T	L	A	S	G	V	S	Y	T-----	Q	G	I	I	W	E	I	I	L	T	F	S	L	L	F	T	V	Y	A	T	I	V	D	P	K	K	G	S-----	L	D	G	F	G	P	L	L	T	G	F	V	V	G	A	N	I	L	A	G	G--A	F	S	G	A	S	M	N	P	A	R	S	F	G	P	A	L	V	S	G---N									
<i>NtAQP1</i>	N	V	V	N	H	G	Y	T	K	G-----	D	G	L	G	A	E	I	I	G	T	F	V	L	V	Y	T	V	F	S	A	T	D	A	K	R	N	A	R	D---S	Y	V	P	I	L	A	P	L	P	I	G	F	A	V	F	L	V	H	L	A	T--I	P	I	T	G	T	G	I	N	P	A	R	S	I	G	A	A	I	I	Y	N	T	D	Q	A		
<i>NtTIPa</i>	-T	L	A	N	G	V	S	Y	G-----	Q	G	I	I	M	E	V	I	L	T	F	S	L	L	F	T	V	Y	T	T	I	V	D	P	K	K	G	I-----	L	E	G	M	G	P	L	L	T	G	L	V	V	G	A	N	I	M	A	G	G--P	F	S	G	A	S	M	N	P	A	R	S	F	G	P	A	F	V	S	G---I									
<i>BpeTIP1;1</i>	-S	L	S	S	G	V	G	V	W-----	N	A	F	V	L	E	I	V	M	T	F	G	L	V	Y	T	V	Y	A	T	A	V	D	P	K	R	G	S-----	V	G	V	I	A	P	I	A	I	G	F	I	V	G	A	N	I	L	A	G	G--A	F	D	G	A	S	M	N	P	A	V	S	F	G	P	A	L	V	S	W---T									
<i>BpeTIP1;2</i>	-S	L	S	S	D	V	S	V	W-----	N	A	V	V	L	E	I	V	M	T	F	G	L	V	Y	T	V	Y	A	T	A	V	D	P	K	K	G	N-----	I	G	I	L	A	P	I	A	I	G	L	I	V	G	A	N	I	L	A	G	G--A	F	D	G	A	S	M	N	P	A	V	S	F	G	P	A	V	V	S	W---S									
<i>BpeTIP1;3</i>	-S	L	S	S	G	V	S	V	W-----	N	A	V	V	F	E	I	V	M	T	F	G	L	V	Y	T	V	Y	A	T	A	V	D	P	K	K	G	N-----	V	G	T	V	A	P	I	A	I	G	F	I	V	G	A	N	I	L	V	G	G--A	F	D	G	A	S	M	N	P	A	V	S	F	G	P	A	V	V	S	W---S									
<i>BpeTIP3;1</i>	-Y	V	T	S	G	V	G	E	W-----	H	G	L	F	E	I	V	M	T	F	T	L	V	Y	T	V	F	A	T	A	I	D	P	K	R	G	S-----	L	G	T	I	A	P	I	A	I	G	F	I	V	G	A	N	I	L	A	G	G--P	F	D	G	A	C	M	N	P	A	R	A	F	G	P	A	L	V	W---R											
<i>BpeTIP2;1</i>	-S	V	A	S	G	V	G	A	I-----	E	G	V	M	E	I	I	T	F	A	L	V	Y	T	V	Y	A	T	A	A	D	P	K	K	G	S-----	L	G	T	I	A	P	I	A	I	G	F	I	V	G	A	N	I	L	A	G	G--P	F	S	G	G	S	M	N	P	A	R	S	F	G	P	A	V	A	S	G---D											
<i>BpeTIP2;2</i>	-G	V	A	S	G	M	N	A	V-----	E	G	V	M	E	I	V	T	F	A	L	V	Y	T	V	Y	A	T	A	A	D	P	K	K	G	S-----	L	G	I	I	A	P	I	A	I	G	F	I	V	G	A	N	I	L	A	G	G--P	F	S	G	G	S	M	N	P	A	R	S	F	G	P	A	V	V	S	G---D											
<i>BpeTIP4;1</i>	-S	L	A	S	G	V	G	Y	L-----	Q	G	V	I	M	E	V	I	L	T	F	S	L	L	F	T	V	Y	A	T	I	V	D	P	K	K	G	A-----	L	D	G	L	G	P	T	L	T	G	F	V	V	G	A	N	I	L	A	G	G--A	F	S	G	A	S	M	N	P	A	R	S	F	G	P	A	L	I	S	G---D									
<i>BpeTIP5;1</i>	-V	I	A	E	E	M	T	G	F-----	G	A	S	L	M	E	G	V	L	T	F	A	L	V	Y	T	V	Y	A	-A	G	D	T	R	R	G	T-----	M	G	A	I	G	I	A	I	G	S	I	A	G	A	N	V	L	A	A	G--P	F	S	G	G	S	M	N	P	A	C	A	F	G	S	A	V	T	A	G---S											
<i>BpeXIP1;1</i>	I	S	A	L	N	R	G	T-----	A	L	V	L	E	F	C	C	T	F	V	L	L	F	V	G	V	T	V	A	F	D	K	K	R	C	K																																																			

110 120 130 140 150 160 170 180 190 200
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NtAQP1 VMGLKRSDSLCSVGIQGVAWAFGGMIFALVYCTAGISGGHINPAVTFGLFLARKLSLTRAIFYIVMQCLGAICGAGVVKGMVGPYQRLGGG---ANVV
NtTIPa AMAANKLNG-D-----AMAHALVVAVTISAGFRISGGHLNPAVTLGLCMGGHITVFRSILYWIWDQLLASVAACALLNYLTAG---LETP---VHTL
AtTIP4;1 AMATDSLVG-NTLVGLFAVAVAHAFVAVMISAG-HISGGHLNPAVTLGLLLGGHISVFRAFLYWIWDQLLASSAACFLLSYLTGG---MGTP---VHTL
AtNIP6;1 AIVNQKTGDGAETLIG---CAASAGLAVMIVILSTGHISGAHLNPAVTIAFAALKHFPPWKHVPVYIGAQVMASVSAAFALKAVFEPTMSG-----GVT
AtNIP2;1 IAVNAQHNHVVTLVG---IAVVWGVIVIMVLVYCLGHLNPAVTLALASSQRFPLNQVPAYITVQVIGSTLASATLRLFFDLNNDVCSKKHDFVLGSG
CpNIP1 AALNGSDAQRVSQLG---ASVAGGLIVTVMIIYAVGHISGAHMNPAVTTAFATRHFPWKQVPLYAAAQLSGATCAAFTRLRLLLHPIKH-----LGTT
BpeNIP1;1 VAVNKIYGSV-TFPG---ICVTWGLIVTVMIIYTVGHISGAHFNPAVTITSAIFRRFPYKEVPLYIAAQLMGSILASGTLALVFDVTPDA-----YFGT
BpeNIP4;1 VVVNKIYGSV-SFPG---ICVVWGLIVMVMIIYSVGHISGAHFNPAVTITFAIFRRFPPLKQVPLYIVAQMIGSTLASATLCALFPVDKKS-----FFGT
BpeNIP1;2 VVVNLGNDKVVTPAG---VSIVWGLAVMVLVYSVGHISGAHFNPAVTIAFATCRRFPWKQVPLYVSAQVLGSTMASGTLRLIFNGHENR-----FVGT
BpeNIP2;1 AALSAADENKVSCLA---ASVAGGLIVTVMIIYAVGHISGAHMNPAVTLAFAAVRHFPWKQVPLYAAAQLAGAI SAAFTLRVILNPIKE-----LGTT
BpeNIP5;1 PIVNQKYNGAESLIG---NAACAGLAVMVLVILSTGHISGAHLNPSLTIAFATLRHFPWLQVPAYIAAQVSGSICASFALKGVFHPYMSG-----GVT
BpeNIP5;2 PIVNEKYQGAETLIG---SAACAGLAVMVLVILSTGHISGAHFNPSVTIAFAALRHFPWKVPGYLVQAQVSASICAFTLRKGVFHPFMSG-----GVT
BpeNIP6;1 AMVNQKTHGSETLLG---CAASSGLAVMVLVILSTGHISGAHLNPAVTIAFAALKHFPPWKHVPVYIGAQVVASFCAAFALKGVFHPIMGG-----GVT
BpeNIP7;1 IACTQLSKGEVGLLE---YAATAGLTVVVVIFSIGHISCAHVNPAVTIAFATFGHFPWSKVPLYILAQTLGSLVLTATCIGQSVYDVKSE-----FMTT

210 220 230 240 250 260 270 280 290 300
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NtAQP1 NHGYTKGDGLGAEIIGTFVLVYTVFSA-TDAKRNARDSYVPILAPLPIGFAVFLVHLATIPITGTGINPARSLGAAIYNTDQAWDDHWIFWVGPFIGAA
NtTIPa ANGVSYGQGIIMEVILTFSLFTVYTTIVDPKKGILEGMGPLLTGLVVGANI---MAGGPFSGASMNPARSFGPAFVSGI---WTDHWVYVWGPLIGGG
AtTIP4;1 ASGVSYTQGIIEWEIIILTFSLFTVYATIVDPKKGSLDGFGLLTGFVVGANI---LAGGAFSGASMNPARSFGPALVSGN---WTDHWVYVWGPLIGGG
AtNIP2;1 SPSGSDLQAFVMEFIITGFLMLVCAVTTTKRT-----TEELEGLIIGATVTNLNVI FAGEVSGASMNPARSIGPALVWGC---YKGIWIYLLAPTLGAV
AtNIP6;1 VPTVGLSQAFALEFIISFNLMFVVTVAVATDTRA-----VGELAGIAVGATVMLNIIAGPATSSASMNPVRTLGPPIAANN---YRAIWVYLTAPILGAL
CpNIP1 TSPGSDLQALVMEIVVTFSMFMFVTCVAVATDTKA-----VGELAGLAVGSAVCITSILAGPVSGGSMNPVRTLGPAMASDN---YKGLWVYFVGPTGTGL
BpeNIP1;1 VPTGSNSQSLVLEILCSFLLMFVISGVTTDSRA-----ISEVAGIAVGMTILLNVFIAGPVSGASMNPARSIRPAVIKHV---YKGLWVYIVGPIIGTI
BpeNIP4;1 APVGSNFQALIIIEIIISFLLMFVICGVATDNRA-----IGELAGIAVGMTITLNVFVAGPVSGASMNPARSIGPALLTHM---YKGLWIYILGPLAGTI
BpeNIP1;2 IPAGSNLQSFALFIITFYLMFVISGVATDNRA-----IGELAGLAVGSTILLNVMFAGPISGASMNPARSLGPAIVHNK---YESIWWVYLVATTLGAI
BpeNIP2;1 SPTGTIEIALVMEIVVTFMTMTASAVATDTKA-----IGELAGLAVGSAVCITSILAGPISGGSMPARTIGPAIASAS---YKGIWVYLVGPVGTGL
BpeNIP5;1 VPSVTEGQAFALEFIITFNLLFVTVAVATDTRA-----VGELAGIAVGATVMLNIIAGPVSSGGSMPVRTLGPPIAAGN---YKSLWIYLVAPTGLAL
BpeNIP5;2 VPAVGIGQAFALEFIVTFTLLFVITAVATDTCA-----VGEFAGIAIGTVMLNIIAGVTTTGASMNPVRTIGPAIAAGT---YKGFWIYMVAPILGAL
BpeNIP6;1 VPSGSYGQAFALEFIISFNLMFVVTVAVATDTRA-----VGELAGIAVGATVMLNIIAGPTTGASMNPVRTLGPPIAANN---YKAIWVYLTAPILGAL
BpeNIP7;1 RPLRGCSAFAWVELIATFIIMFLAASVTYQHQS-----VGHLSGFVVGIAISL---AVPVSGGSMNPARS LGPAIISGK---FNDIWIYMTAPTIGAV