

HomoGalacturonan-Modifying Enzymes (HGMEs): structure, expression and roles in plants

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SUPPLEMENTARY DATA

Supplementary Table S1. Comparative inventory of the structural motifs of PME, PAE, PG and PLL isoforms between dicot and monocot species.

Detection of putative signal peptides (SP) and/or transmembrane domains (TM) by *in silico* analysis was performed using SignalP4.0 (<http://www.cbs.dtu.dk/services/SignalP/>) and TargetP1.1 (<http://www.cbs.dtu.dk/services/TargetP/>) programs. A lack of targeting motifs characterizes predicted soluble proteins (SOL).

Plant species	Nb isoforms	Structural motifs			
		SP	SP+TM	TM	SOL
PME					
<i>Arabidopsis thaliana</i> (Dicots)	66 (100%)	35 (53%)	2 (3%)	25 (38%)	4 (6%)
<i>Oryza sativa</i> (Monocots)	41 (100%)	19 (46%)	3 (7%)	15 (37%)	4(10%)
PAE					
<i>Arabidopsis thaliana</i> (Dicots)	12 (100%)	7 (58%)	2 (17%)	3 (25%)	0 (0%)
<i>Oryza sativa</i> (Monocots)	10 (100%)	6 (60%)	1 (10%)	2 (20%)	1 (10%)
PG					
<i>Arabidopsis thaliana</i> (Dicots)	68 (100%)	50 (74%)	1 (1%)	11 (16%)	6 (9%)
<i>Oryza sativa</i> (Monocots)	45 (100%)	31 (69%)	0 (0%)	5 (11%)	9 (20%)
PLL					
<i>Arabidopsis thaliana</i> (Dicots)	26 (100%)	20 (77%)	1 (4%)	2 (7%)	3 (12%)
<i>Oryza sativa</i> (Monocots)	12 (100%)	6 (50%)	0 (0%)	2 (17%)	4 (33%)
All HGMEs					
<i>Arabidopsis thaliana</i> (Dicots)	172 (100%)	112 (65%)	6 (3%)	41 (24%)	13 (8%)
<i>Oryza sativa</i> (Monocots)	108 (100%)	62 (57%)	4 (4%)	24 (22%)	18 (17%)

Supplementary Table S2. Gene expression variations of HG-modifying enzyme inhibitor proteins (PMEIs, PGIPs) after biotic stresses. Piercing-sucking insects (yellow box), chewing insects (turquoise), nematodes (blue), bacteria (black), fungi (light gray) and viruses (red). Bolded species names indicate necrotrophic pathogens.

Gene name	AGI or accession	Stress	Species name	Induction	References
Pectin Methyl Esterase Inhibitors (PMEIs)					
<i>AtPMEI</i> <i>AtPMEI3</i>	At2g26440 At5g20740	Aphid	<i>Brevicoryne brassicae</i>	32 aphids/plant upregulated 6, 12, 24, 48 hpi (x1.39, 1.93, 2.19, 1.78) downregulated 6, 48 hpi (x-1.62, -2.08)	Kusnierczyk <i>et al.</i> 2008
<i>AtPMEI</i>	At5g62360	Aphid	<i>Myzus persicae</i>	40 aphids/plant; 72 hpi upregulated (x1200 μ arr, 1800 qRT-PCR)	De Vos <i>et al.</i> 2005
<i>AtPMEI</i> <i>AtPMEI</i>	At4g25260 At1g14890	Whitefly	<i>Bemisia tabaci</i>	100 whiteflies/plant; 21 dpi upregulated (x-1.96) upregulated (x-2.40)	Kempema <i>et al.</i> 2007
<i>AtPMEI</i>	At1g23205	Aphid	<i>Myzus persicae</i> saliva infiltration	50 aphids/plant; 24 (OS), 48, 72 (OS+feeding) hpi downregulated (x-2.1, -6.5, -5.5)	De Vos <i>et al.</i> 2009
<i>AtPMEI</i>	At1g62770	Aphid	<i>Brevicoryne brassicae</i>	32 aphids/plant, 72 hpi downregulated (x-4.03)	Kusnierczyk <i>et al.</i> 2011
<i>AtPMEI</i>	At1g47960	Chewing insect	<i>Spodoptera littoralis</i> OS	1mm holes punctured and 1 uL of insect OS applied; 6, 24 hpi upregulated (x 6.54, 2.75)	Consales <i>et al.</i> 2011
<i>AtPMEI</i>	At5g62340	Nematode	<i>Meloidogyne javanica</i>	10-12 J2 nematodes/root tip; 3 dpi downregulated (x-4.59)	Barcala <i>et al.</i> 2010
<i>Capsicum annuum</i> (Pepper) <i>CaPMEI</i>		Bacterium	<i>Xanthomonas campestris</i>	108 cfu/mL; upregulated (at 1, 2, 4, 6, 12, 18 hpi qRT-PCR)	An <i>et al.</i> 2008
<i>Solanum tuberosum</i> (Potato) <i>StPMEI</i>	STMER56 (At1g23205)	Virus	PVY ^N and PVY ^{NTN}	0.5 hpi downregulated (x-1.44 μ arr, -1.64 qRT-PCR)	Kogovsek <i>et al.</i> 2010
Polygalacturonase Inhibitor Proteins (PGIPs)					
<i>AtPGIP</i>	At5g49215	Aphid	<i>Brevicoryne brassicae</i>	32 aphids/plant, 6, 12, 24, 48 hpi downregulated (x-1.21, -1.46, -1.38, -1.52)	Kusnierczyk <i>et al.</i> 2008
		Chewing insect	<i>Spodoptera littoralis</i> OS	1mm holes punctured and 1 uL of insect OS applied; 6, 24 hpi	Consales <i>et al.</i> 2011

<i>AtPGIP</i>	At3g12145			upregulated (x6.28, 3.73)	
		Chewing insect	<i>Spodotera littoralis</i>	32 newly hatched larvae on 22 plants, 7-8 dai	Bodenhaussen & Reymond 2007
<i>AtPGIP1</i>	At5g06860			upregulated (x5.17)	
		Chewing insect	<i>Pieris rapae</i>	upregulated (x9.38)	Bodenhaussen & Reymond 2007
<i>AtPGIP1</i>	At5g06860			1 newly hatched larva/plant, 7-8 dai	
<i>Phaseolus vulgaris</i> (Bean)		Fungus	<i>Rhizoctonia solani</i>	8, 16 hpi	Guerrero-Gonzalez <i>et al.</i> 2011
<i>PvPGIP</i>	At5g49215			upregulated (x2.5, 2.7)	
<i>Pisum sativum</i> (Pea)		Nematode	<i>Heterodera goettingiana</i>	150 J2 nematodes on 10 days-old seedling; 24 or 48 hpi	Veronico <i>et al.</i> 2011
<i>Pspgip1</i>				upregulated (x7.00, x2.75)	