A Comprehensive Toolkit of Plant Cell Wall Glycan-Directed Monoclonal Antibodies

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SUPPLEMENTAL MATERIALS

Supplemental Methods:

Hierarchical clustering of mAbs. This clustering analysis was tailored for comparison of the ELISA responses among the mAbs when tested against the panel of polysaccharides. A matrix of ELISA data was generated, with each row vector of this matrix consisting of the raw ELISA response vector for a particular mAb assayed against the set of polysaccharides. Each row vector was normalized to unit length and then a correlation matrix was generated by calculating the dot product of each pair of rows in the normalized data matrix. Thus, each element of the correlation matrix corresponds to the cosine of the arc (on the surface of a unit hypersphere) connecting two of the normalized row vectors in the data matrix. A distance matrix was generated based on the arccosines of the elements of the correlation matrix. Hierarchical clustering was performed by calling the R function `hclust` using this distance matrix as its argument to generate a cluster matrix, which was used to generate a mAb dendrogram. A similar process was used to generate a polysaccharide dendrogram, using the columns of the normalized data matrix as the initial input. The R `heatmap` function was modified and used to create a heat map, using the two dendrograms and the initial data matrix as inputs (Figure 2).

To compare experimental replicates of the ELISA data sets, “data correlation heat maps” were generated. Two raw data matrices (one for the reference data set and one for the test data set) were generated as described above. The rows of the reference matrix were clustered and a dendrogram of mAb ELISA response patterns was generated as described above. Then, a different kind of correlation matrix, in which each element consists of the dot product of a row vector in the test matrix with a row vector in the reference matrix, was generated (Figure 1). This correlation matrix was plotted using a modification of the R `heatmap` function with the mAb dendrogram for the reference data set and the correlation matrix as input arguments. In this heat map, the order of rows (mAbs in the reference matrix) and columns (mAbs in the test matrix) is the same, both being based on the dendrogram generated by clustering rows of ELISA data in the reference matrix. Each cell on the diagonal of this heat map (*i.e.*, each element on the diagonal of the correlation matrix) thus corresponds to the correlation of two independent experimental measurements of the ELISA response pattern for a particular mAb. Each off-diagonal element in the correlation matrix corresponds to the correlation of the ELISA response pattern for a mAb (*i.e.*, row vector *i* from one experiment) with the ELISA response pattern for another mAb (row vector *j* from another experiment). Perfectly reproducible data corresponds to the situation where response vectors *i* and *j* in the reference matrix are equal to the corresponding response vectors in the test matrix. This would result in a correlation matrix (heat map) in which all diagonal elements have a value of one. This matrix would also be symmetrical about the diagonal, as the correlation of row vector *i* in the reference matrix with row vector *j* in the test matrix would be equal to the correlation of row vector *j* in the reference matrix with row vector *i* in the test matrix.

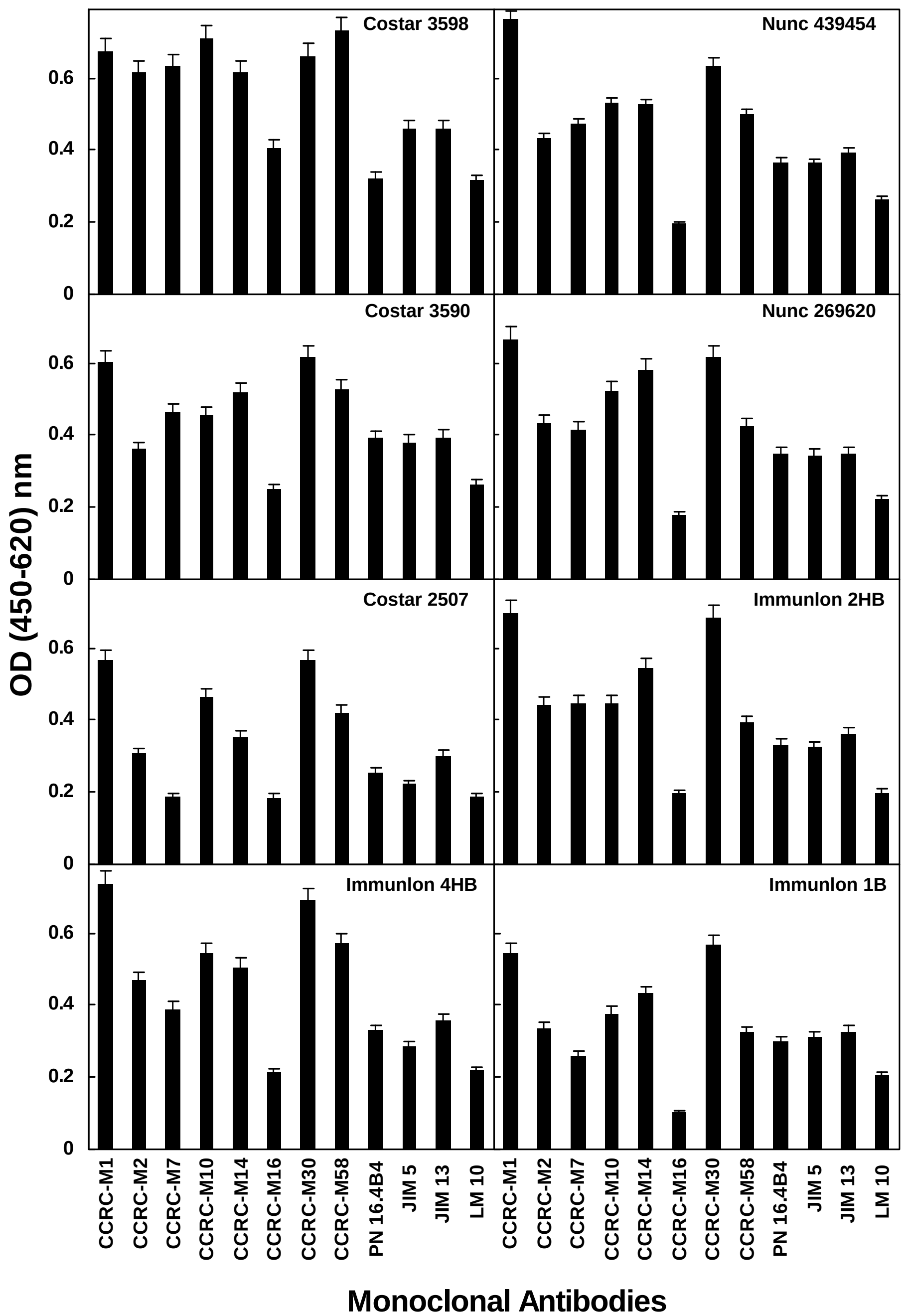

Figure S1. Suitability of 96-well plates for polysaccharide ELISAs.

Twelve mAb/polysaccharide pairs (see Materials and Methods) were tested on eight commercially available 96-well plates to determine which plates are best suited for immobilization of wall polysaccharides and subsequent ELISAs. Bars indicate the OD value given by each mAb when tested in the ELISA against a polysaccharide that mAb is known to recognize.

Table S1: Plant polysaccharide preparations used in this study.

Polysaccharide preparations are grouped with respect to the predominant glycan component. Information is provided as to the plant origin of the preparation, abbreviation used in the paper, source and sugar composition.

Polysaccharide class	Preparation (Abbreviation)	Source and reference(s)/website for structural studies	Sugar composition (Mol %)
XGs	Tamarind Xyloglucan (Tam XG)	CCRC, UGA; (York et al., 1993), Hahn lab data (unpublished)	Glc (43), Xyl (37), Gal (17) and Ara (3)
	Tomato Xyloglucan (Tom XG)	CCRC, UGA; (Jia et al., 2003), Hahn lab data (unpublished)	Glc (44), Xyl (32), Gal (14) and Ara (10)
	Sycamore Maple Xyloglucan (Syc XG)	CCRC, UGA; (Stevenson et al., 1986), Hahn lab data (unpublished)	Glc (42), Xyl (31), Gal (10), Man (9), Fuc (4) and Ara (4)
Xylans	Wheat Arabinoxylan (Wh Ara Xyl)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-WAXYL.pdf	Ara (37), Xyl (61) and traces of other sugars
	4-O-Methylglucurono-xylan (MeGLA Xyl)	Sigma-Aldrich, St. Louis, MO; Hahn lab data (unpublished)	Xyl (82.8) and Methyl GlcA (17.2)
	Birch Wood Xylan (BW Xyl)	Sigma-Aldrich, St. Louis, MO; Hahn lab data (unpublished)	Xyl (100)
	Phormium tenax Partially Hydrolysed Xylan (PT Xyl PH)	IRL, New Zealand; Hahn lab data (unpublished)	Xyl (94) and Gluc (6)
	Phormium tenax Low Arabinose Xylan (PT Xyl LA)	IRL, New Zealand; Hahn lab data (unpublished)	Xyl (87), Ara (8) and Glc (5)
	Phormium cookianum High Arabinose Xylan (PC Xyl)	IRL, New Zealand; Hahn lab data (unpublished)	Xyl (70), Ara (27) and Glc (3)
	Corn Xylan (Corn Xyl)	National Renewable Energy Lab, Golden, CO; Hahn lab data (unpublished)	Xyl (100)
	Poplar Xylan (Pop Xyl)	National Renewable Energy Lab, Golden, CO; Hahn lab data (unpublished)	Xyl (94), GalA (4) and Rha (2)
	Eucalyptus KOHss (Eucal KOH)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Xyl (81), UA (13), Gal (3), Rha (2), Ara (1), Glc (1) and Man (1)
	Sorghum BE1 (Sorg BE1)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Ara (45.8), Xyl (40.9), UA (9.8), Gal (1.8), Glc (1.7) and Man (0.2)
	Corn BE1 (Corn BE1)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Ara (38.4), Xyl (48.3), UA (8.3), Gal (4.3), Glc (0.7) and Man (0.1)
Mannans	Tomato Glucomannan (Tom Gluc Man)	CCRC, UGA; Hahn lab data (unpublished)	Glc (61) and Man (39)
	Guar Galactomannan (Guar Gal Man)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-GGMMV.pdf	Man (62) and Gal (38)
	Gum Guar (Gum Guar)	Sigma-Aldrich, St. Louis, MO; Hahn lab data (unpublished)	Man (63), Gal (36) and Ara (1)
	Locust Bean Gum (Loc Bean Gum)	Sigma-Aldrich, St. Louis, MO; Hahn lab data (unpublished)	Man (81) and Gal (19)

β-Glucans	(1→3)(1→4)-β-Glucan (1314 Gluc)	Megazyme, Bray, Ireland; Hahn lab data (unpublished); Hahn lab data (unpublished)	Glc (97), Man (2) and Ara (1)
	(1→3)(1→6)-β-Glucan (1316 Gluc)	CCRC, UGA; (Hahn et al., 1992), Hahn lab data (unpublished)	Glc (91), Man (7) and Ara (2)
	Pachyman (Pachyman)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-PACHY.pdf	D-glucose essentially all of which is 1,3-ß-linked (>98)
	Lichenan (Lichenan)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-LICHN.pdf	Glc (98) and Ara (2)
Galactans	Lupin Galactan (Lup Gal)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-GALLU.pdf	Gal (83), GalA (5), Rha (5), Ara (3), Xyl (2) and traces of Glc
	Potato Galactan (Pot Gal)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-GALPOT.pdf	Gal (88), GalA (6), Ara (3) and Rha (3)
AGs	Larch Arabinogalactan (Lar Ara Gal)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-ARGAL.pdf	Gal (81), Ara (14) and traces of other sugars
	Gum Arabic (Gum Arabic)	Sigma-Aldrich, St. Louis, MO; (Stephen, Phillips, and Williams, 2006); Hahn lab data (unpublished)	Ara (37), Gal (40), Rha (20) and traces of Glc
	Gum Ghatti (Gum Ghatti)	Sigma-Aldrich, St. Louis, MO; (Stephen, Phillips, and Williams, 2006); Hahn lab data (unpublished)	Ara (49), Gal (31), Man (10), GlcA (8) and Xyl (2)
	Gum Tragacanth (Gum Trag)	Sigma-Aldrich, St. Louis, MO; (Stephen, Phillips, and Williams, 2006); Hahn lab data (unpublished)	Gal (32.3), Ara (31.7), Xyl (12), Glc (12.3), Fuc (8.4) and Rha (3.3)
	Arabinan (Sug Beet MGZ Branch Arab)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-ARAB.pdf	Ara (88), Gal (3), Rha (2) and GalA (7)
	Linear Arabinan (Sug Beet MGZ Lin Arab)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-LARB.pdf	Ara (97.5), GalA (2), Gal (0.4) and Rha (0.1)
	Sugar Beet Linear Arabinan (Sug Beet Lin Arab)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Ara (74), UA (14) and Gal (12)
	Sugar Beet Branched Arabinan (Sug Beet Branch Arab)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Ara (>80)
	Potato Arabinogalactan (Pot Ara Gal)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Gal (63), Ara (20) and UA (17)
	Arabinogalactan II (Ara Gal II)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Gal (84) and Gal (16)
RG-I	Sycamore Maple Pectic Polysaccharides (Syc PecP)	CCRC, UGA; (Stevenson et al., 1986); Hahn lab data (unpublished)	Gal (52.4), GlcA (15), GalA (11), Xyl (7.9), Ara (7.5), Glc (2.6), Rha (2), Man (1.3) and traces of Fuc
	Tomato Pectic Polysac-charides (Tom PecP)	CCRC, UGA; (Jia et al., 2003); Hahn lab data (unpublished)	Gal (57.4), Ara (25.2), GalA (6.5), Rha (4.4), Xyl (4.3) and Fuc (2.2)
	Physcomitrella patens Pectic Polysaccharides (PhyscPecP)	CCRC, UGA; (Peña et al., 2008)	GalA (46.7), Rha (24), Gal(17.4), Ara (8.1), Glc (2.3) and 1.5 (Xyl)
	Gum Karaya (Gum Karaya)	Sigma-Aldrich, St. Louis, MO; Hahn lab data (unpublished)	GalA (57), GlcA (8), Gal (17), Rha (16) and traces of Glc
	Potato RG-I (Pot RG-I)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-RHAM1.pdf	GalA (51), Rha (28.6), Gal (14), Ara (5.4) and Xyl (1)

	Soybean RG-I (Soy RG-I)	Megazyme, Bray, Ireland; Hahn lab data (unpublished), http://secure.megazyme.com/downloads/en/data/P-RHAGN.pdf	GalA (51), Xyl (13), Gal (11), Rha (10), Fuc (9) and Ara (6)
	Arabidopsis thaliana RG-I (At RG-I)	CCRC, UGA; (Zablackis et al., 1995)	GalA (34), Rha (27), Gal (17), Ara (14), Xyl (5), Fuc (1), GlcA (1) and GalA (1)
	Green Tomato Fruit RG-I (GrTomFrRG-I)	CCRC, UGA; Hahn lab data (unpublished)	GalA (49.5), Gal (43.8), Rha (4.7), GlcA (1), Ara (0.5) and traces of Xyl and Glc
	Lettuce RGI (Let RG-I)	CCRC, UGA; Hahn lab data (unpublished)	Gal (54.9), GalA (23.4), Rha (6.9), GlcA (5.7), Ara (4.9) and Xyl (4.2)
	RG-I from Okra (Okra RG-I)	Dr. Henk Schols, Laboratory of Food Chemistry, Wageningen, The Netherlands; personal communication	Gal (53), GalA (26), Rha (14), GlcA (4), Glc (2.5) Ara (1) and Man (1)
Mucilages	*Arabidopsis thaliana* Seed Mucilage (At Seed Muc)	CCRC, UGA; Hahn lab data (unpublished)	Rha (69), GalA (27.7), Gal (1.8) and Xyl (1.5)
	Sinapus Seed Mucilage (Sin Seed Muc)	CCRC, UGA; Hahn lab data (unpublished)	GalA (57), Gal (19), Rha (12), GlcA (10) and traces of Man and Glc
	Peppergrass Seed Mucilage (Pep Gr S Muc)	CCRC, UGA; Hahn lab data (unpublished), (Deng et al., 2009)	GlcA (22.2), GalA (22.1), Gal (18.9), Xyl (9.8), Rha (8), Glc (7), Fuc (5.2), Ara (5) and Man (1.8)
	Camelina Seed Mucilage (Cam Seed Muc)	CCRC, UGA; Hahn lab data (unpublished)	Rha (57.1), GalA (24.4), Gal (13.3), Xyl (2.2), Ara (2.3) and Man (0.8)
	Linseed Mucilage (Lin Seed Muc)	CCRC, UGA; Hahn lab data (unpublished)	Rha (44.2), GalA (18.5), Xyl (15.8), Gal (11.1), Fuc (3), Ara (4.6) and Glc (2.9)
HGs	Citrus Pectin (Citrus Pect)	Hercules, Wilmington, DE; Hahn lab data (unpublished)	GalA (85), Rha (13) and Gal (2)
	73% Me Pectin (73%MePect))	Hercules, Wilmington, DE; Hahn lab data (unpublished)	GalA (81), Gal (7), Rha (6.5), Ara (4.6) and Glc (0.9)
	55% Me Pectin (55%MePect)	Hercules, Wilmington, DE; Hahn lab data (unpublished)	GalA (81), Gal (10), Rha (9)
	33% Me Pectin (33%MePect)	Hercules, Wilmington, DE; Hahn lab data (unpublished)	GalA (89), Gal (7), Rha (4)
	High-acetyl Sugar Beet β-Pectin (HAc Sug Beet Pect)	Hercules, Wilmington, DE; Hahn lab data (unpublished)	GalA (56.2), Rha (21.3), Gal (15) and Ara (7.5)

Table S2: Monoclonal antibodies included in this study.

McAbs are grouped according to the major glycan recognized. The order of the antibodies within each group arises out of the hierarchical clustering analysis of the polysaccharide screening ELISA data (Figure 2). Information is provided for each McAb as to the immunogen used to generate the antibody, animal source, isotype (including light chain specifications) and references.

Glycans	Antibody	Immunogen	Animal	Isotype	References
Non-fucosylated XG	CCRC-M54	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M48	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M49	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M96	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG3(λ)	
	CCRC-M50	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M51	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M53	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	LM15	XXXG-BSA (covalent)	Rat	IgG2c(κ)	(Marcus et al., 2008)
	CCRC-M100	Sycamore Xyloglucan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M103	Sycamore Xyloglucan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M58	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M86	Tomato Xyloglucan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M55	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M52	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M99	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M95	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M101	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M104	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M89	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M93	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M87	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M88	Tomato Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M57	Tamarind Xyloglucan-BSA (covalent)	Mouse	IgG1(λ)	
	CCRC-M90	Tomato Xyloglucan-BSA (covalent)	Mouse	IgM(λ)	
	CCRC-M47	*Arabidopsis thaliana* Cell Wall	Mouse	IgM(λ)	

Xylan-1	CCRC-M111	*Phormium tenax* xylan (low arabinose)/MeBSA	Mouse	IgG1(λ)	
	CCRC-M108	*Phormium tenax* xylan (low arabinose)/MeBSA	Mouse	IgG1(λ)	
	CCRC-M109	*Phormium tenax* xylan(low arabinose)/MeBSA	Mouse	IgG1(λ)	
Fycosylated XG	CCRC-M102	Sycamore Xyloglucan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M39	4-O-methylglucuronoxylan (Sigma)/MeBSA	Mouse	IgA(κ)	
	CCRC-M106	Sycamore Xyloglucan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M84	Sycamore Pectic Polysaccharides/MeBSA	Mouse	IgM(κ)	
	CCRC-M1	Sycamore RG-I/MeBSA	Mouse	IgG1(κ)	(Puhlmann et al., 1994)
Undefined	CCRC-M76	Sycamore Pectic Polysaccharides/MeBSA	Mouse	IgG1(κ)	
Linseed Mucilage RG-I	JIM3	Carrot Protoplasts	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	CCRC-M40	*Arabidopsis thaliana* Cell Wall	Mouse	IgM(κ)	
	CCRC-M83	*Arabidopsis thaliana* RG-II/MeBSA	Mouse	IgM(κ)	
	CCRC-M82	*Arabidopsis thaliana* RG-II/MeBSA	Mouse	IgM(κ)	
	MH4.4E4	Tobacco (*Nicotiana tabacum*) Leaf Protoplasts	Mouse	IgM(κ)	(Hahn et al., 1987)
	MH4.2A4	Tobacco (*Nicotiana tabacum*) Leaf Protoplasts	Mouse	IgM(κ)	(Hahn et al., 1987)
	CCRC-M142	Linseed Mucilage RGI/MeBSA	Mouse	IgM(κ)	
	CCRC-M141	Linseed Mucilage RGI/MeBSA	Mouse	IgG2b(κ)	
Xylan-2	CCRC-M119	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgM(κ)	
	CCRC-M115	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgG1(κ)	
	CCRC-M110	*Phormium tenax* xylan (low arabinose)/MeBSA	Mouse	IgG1(λ)	
	CCRC-M105	*Phormium tenax* xylan (low arabinose)/MeBSA	Mouse	IgA(κ)	
	CCRC-M117	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgG1(κ)	
	CCRC-M113	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgG1(κ)	
	CCRC-M120	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgM(κ)	
	CCRC-M118	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgM(κ)	
	CCRC-M116	*Phormium tenax* xylan (low arabinose)/MeBSA	Mouse	IgM(κ)	
	CCRC-M114	*Phormium cookianum* xylan (high arabinose)/MeBSA	Mouse	IgM(κ)	
	CCRC-M154	Corn Stover Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M150	Corn Stover Xylan-BSA (covalent)	Mouse	IgG3(κ)	
Undefined	MAC265	Infection Thread Matrix Glycoproteins	Rat	IgG2a(κ)	(VandenBosch et al., 1989)
	CCRC-M97	*Physcomitrella patens* Pectic Polysaccharides/MeBSA	Mouse	IgA(κ)	

Physcomitrella Pectin	CCRC-M98	*Physcomitrella patens* Pectic Polysaccharides/MeBSA	Mouse	IgG1(κ)	
	CCRC-M94	*Physcomitrella patens* Pectic Polysaccharides/MeBSA	Mouse	IgM(κ)	
RG-Ia	CCRC-M5	Sycamore RG-I/MeBSA	Mouse	IgG1(κ)	(Puhlmann et al., 1994)
	CCRC-M2	Sycamore RG-I/MeBSA	Mouse	IgM(κ)	(Puhlmann et al., 1994)
RG-Ib	CCRC-M23	Wine RG-II-cBSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M17	Sycamore RG-II-cBSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M19	Sycamore RG-II-cBSA (covalent)	Mouse	IgM(κ)	
	CCRC-M18	Sycamore RG-II-cBSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M56	Soybean RG-I (Megazyme)/MeBSA	Mouse	IgG1(κ)	
	CCRC-M16	Sycamore RG-II-cBSA (covalent)	Mouse	IgG1(κ)	
RG-Ic	JIM137	Feruloylated Sugarbeet Cell Wall Pectins	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	JIM101	Liverwort (*Gymnocolea inflata*) AGP	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	CCRC-M135	*Camelina sativa* Seed Mucilage/MeBSA	Mouse	IgA(κ)	
	CCRC-M61	Sinapus Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M30	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(κ)	
Galacto-mannan	CCRC-M75	Guar Galactomannan (Megazyme)-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M70	Guar Galactomannan (Megazyme)-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M74	Guar Galactomannan (Megazyme)-BSA (covalent)	Mouse	IgM(κ)	
β-1,3 Glucan	LAMP	Laminarin-Haemocyanin (covalent)	Mouse	IgG1(κ)	(Meikle et al., 1991)
AG-1	JIM93	Pea Protoplast Membrane	Rat	IgG2c(κ)	(K. Roberts, pers. comm.)
	JIM94	Pea Protoplast Membrane	Rat	IgG2c(κ)	(K. Roberts, pers. comm.)
	JIM11	Carrot Cell Nuclear Matrix Protein Extract	Rat	IgG2c(κ)	(Smallwood et al., 1994)
	MAC204	Pea Peribacteroid Membrane	Mouse	IgM(κ)	(Bradley et al., 1988)
	JIM20	Pea Guard Cell Protoplasts	Rat	IgM(κ)	(Smallwood et al., 1994)
AG-2	LM6	Arabinoheptaose-BSA (covalent)	Rat	IgG2c(κ)	(Willats et al., 1998)
	JIM14	Carrot AGP2	Rat	IgM(κ)	(Knox et al., 1991)
	MAC207	Pea Peribacteroid Membrane	Mouse	IgM(κ)	(Bradley et al., 1988)
	JIM19	Pea Guard Cell Protoplasts	Rat	IgM(κ)	(Wang et al., 1995)
	JIM12	Carrot Cell Nuclear Matrix Protein Extract	Rat	IgM(κ)	(Smallwood et al., 1994)
	CCRC-M133	Citrus Pectin/MeBSA	Mouse	IgM(κ)	
	CCRC-M107	*Arabidopsis thaliana* RG-II/MeBSA	Mouse	IgM(κ)	
	LM5	Galactotetraose-BSA (covalent)	Rat	IgG2c(κ)	(Jones et al., 1997)

Undefined	CCRC-M136	Peppergrass Seed Mucilage/MeBSA	Mouse	IgG1(κ)	
	LM8	Xylogalacturonan/MeBSA	Rat	IgM(κ)	(Willats et al., 2004)
AG-3	JIM4	Carrot Protoplasts	Rat	IgM(κ)	(Knox and Roberts, 1989)
	CCRC-M31	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	JIM17	Carrot Extracellular Glycoproteins	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	LM1	Rice Hydroxyproline-Rich Glycoproteins (Extensin)	Rat	IgM(κ)	(Smallwood et al., 1995)
	CCRC-M26	Phytophthora Void Glucan-BSA (covalent)	Mouse	IgA(κ)	
	JIM15	Carrot AGP1	Rat	IgM(κ)	(Knox et al., 1991)
	JIM8	Sugarbeet Suspension-Cultured Protoplasts	Rat	IgG2c(κ)	(Pennell et al., 1991)
	CCRC-M85	Sycamore Pectic Polysaccharides/MeBSA	Mouse	IgM(κ)	
	CCRC-M81	Sycamore Pectic Polysaccharides/MeBSA	Mouse	IgM(κ)	
	MAC266	Golgi Glycoproteins	Rat	IgG2a(κ)	(Perotto et al., 1991)
	PN16.4B4	Tobacco (*Nicotiana glutinosa*) Cell Membranes	Mouse	IgM(κ)	(Norman et al., 1986)
Pectic Backbone	CCRC-M132	Peppergrass Seed Mucilage/MeBSA	Mouse	IgG1(κ)	
	CCRC-M131	Peppergrass Seed Mucilage/MeBSA	Mouse	IgG1(κ)	
	CCRC-M38	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgG1(κ)	
	JIM5	Carrot Protoplasts	Rat	IgG2a(κ)	(Knox et al., 1990; VandenBosch et al., 1989)
	PAM1	Not applicable	Human	not applicable	(Willats et al., 1999)
	CCRC-M69	Sinapus Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M35	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M36	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M14	Sycamore RG-I/MeBSA	Mouse	IgM(κ)	
	CCRC-M129	Citrus Pectin /MeBSA	Mouse	IgG1(κ)	
	CCRC-M72	Sinapus Seed Mucilage/MeBSA	Mouse	IgA(κ)	
	LM7	Lime pectin	Rat	IgM(κ)	(Willats et al., 2001)
	CCRC-M34	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(λ)	
	CCRC-M130	Heat-treated Citrus Pectin	Mouse	IgG1(κ)	
	JIM136	Feruloylated Sugarbeet Cell Wall Pectins	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	JIM7	Carrot Protoplasts	Rat	IgA(κ)	(Knox et al., 1990)

AG-4	PN16.1B3	Tobacco (*Nicotiana glutinosa*) Cell Membranes	Mouse	IgM(κ)	(Norman et al., 1986)
	CCRC-M124	RG-I pentamer-KLH (covalent)	Mouse	IgG1(κ)	
	JIM133	Zinnea Tracheary Element Cell Walls	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	JIM13	Carrot AGP2	Rat	IgM(κ)	(Knox et al., 1991)
	LM2	Rice Arabinogalactan Proteins	Rat	IgM(κ)	(Smallwood et al., 1996)
	CCRC-M92	Sycamore Pectic Polysaccharides/MeBSA	Mouse	IgM(κ)	
	CCRC-M91	Sycamore Pectic Polysaccharides/MeBSA	Mouse	IgM(κ)	
	CCRC-M78	*Arabidopsis thaliana* EPG RG-I/MeBSA	Mouse	IgM(κ)	
RG-I/AG	CCRC-M60	Sinapus Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M41	*Arabidopsis thaliana* Cell Wall	Mouse	IgM(κ)	
	CCRC-M80	*Arabidopsis thaliana* RG-II/MeBSA	Mouse	IgG1(κ)	
	CCRC-M79	*Arabidopsis thaliana* EPG RG-I/MeBSA	Mouse	IgG1(κ)	
	CCRC-M44	*Arabidopsis thaliana* Cell Wall	Mouse	IgM(κ)	
	CCRC-M33	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M32	*Arabidopsis thaliana* Seed Mucilage/MeBSA	Mouse	IgM(κ)	
	CCRC-M13	Sycamore RG-I/MeBSA	Mouse	IgG1(κ)	
	CCRC-M42	*Arabidopsis thaliana* Cell Wall	Mouse	IgM(κ)	
	CCRC-M24	Wine RG-II-cBSA (covalent)	Mouse	IgM(κ)	
	CCRC-M12	Sycamore RG-I/MeBSA	Mouse	IgG1(κ)	(Puhlmann et al., 1994)
	CCRC-M7	Sycamore RG-I/MeBSA	Mouse	IgG1(κ)	(Puhlmann et al., 1994)
	CCRC-M77	*Arabidopsis thaliana* EPG RG-I/MeBSA	Mouse	IgG1(κ)	
	CCRC-M25	Wine RG-II-cBSA (covalent)	Mouse	IgM(κ)	
	CCRC-M9	Sycamore RG-I/MeBSA	Mouse	IgM(κ)	
	CCRC-M128	Citrus Pectin /MeBSA	Mouse	IgM(κ)	
	CCRC-M126	RG-I pentamer-KLH (covalent)	Mouse	IgG3(κ)	
	CCRC-M134	Citrus Pectin/MeBSA	Mouse	IgG3(κ)	
	CCRC-M125	RG-I pentamer-KLH (covalent)	Mouse	IgM(κ)	
	CCRC-M123	RG-I pentamer-KLH (covalent)	Mouse	IgG1(κ)	
	CCRC-M122	RG-I pentamer-KLH (covalent)	Mouse	IgG1(κ)	
	CCRC-M121	RG-I pentamer-KLH (covalent)	Mouse	IgG1(κ)	
	CCRC-M112	*Arabidopsis thaliana* RG-II/MeBSA	Mouse	IgG3(κ)	
	CCRC-M21	Sycamore RG-I (0.4% Ara)/MeBSA	Mouse	IgG3(κ)	

	JIM131	Zinnea Tracheary Element Cell Walls	Rat	IgG1(κ)	(K. Roberts, pers. comm.)
	CCRC-M22	Sycamore RG-I (0.4% Ara)/MeBSA	Mouse	IgG1(κ)	
	JIM132	Zinnea Tracheary Element Cell Walls	Rat	IgM(κ)	(K. Roberts, pers. comm.)
	JIM1	Carrot Protoplasts	Rat	IgG2c(κ)	(K. Roberts, pers. comm.)
	CCRC-M15	Sycamore RG-I/MeBSA	Mouse	IgM(κ)	
	CCRC-M8	Sycamore RG-I/MeBSA	Mouse	IgM(κ)	
	MH4.3E5	Tobacco (*Nicotiana tabacum*) Leaf Protoplasts	Mouse	IgM(κ)	(Hahn et al., 1987)
	JIM16	Carrot AGP1	Rat	IgM(κ)	(Knox et al., 1991)
Xylan-3	CCRC-M160	Corn Cob Red-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M137	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M152	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M149	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	AX1	Oligo-arabinoxylan-BSA (covalent)	Mouse	IgG1(λ)	(Guillon et al., 2004)
	CCRC-M144	Corn Stover Xylan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M143	Corn Stover Xylan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M146	Corn Stover Xylan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M145	Corn Stover Xylan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M155	Corn Stover Xylan-BSA (covalent)	Mouse	IgG1(κ)	
Xylan-4	CCRC-M153	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M151	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M157	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M148	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M156	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M140	Oat Xylan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M139	Oat Xylan-BSA (covalent)	Mouse	IgG1(κ)	
	CCRC-M159	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M138	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	CCRC-M147	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	LM10	Xylopentaose-BSA (covalent)	Rat	IgG2c(κ)	(McCartney et al., 2005)
	CCRC-M158	Oat Xylan-BSA (covalent)	Mouse	IgM(κ)	
	LM11	Xylopentaose-BSA (covalent)	Rat	IgM(κ)	(McCartney et al., 2005)

Table S3: Coefficients correlating the ELISA responses obtained in one experiment with the averages of ELISA responses from six experiments.

Correlation coefficients were calculated as the dot product of the normalized data vectors.

mAb	Correlation Coefficient
CCRC-M30	0.923
CCRC-M56	0.986
CCRC-M16	1.000
CCRC-M2	0.998
CCRC-M1	1.000
CCRC-M31	0.998
CCRC-JIM3	1.000
CCRC-M24	0.985
CCRC-M7	1.000
CCRC-M21	0.999
CCRC-M13	0.999
CCRC-M32	0.999
CCRC-M42	0.999
CCRC-M60	0.994
CCRC-M77	0.999
CCRC-M33	1.000
CCRC-M9	0.999
CCRC-M79	0.998
JIM16	1.000
JIM1	1.000
JIM14	1.000
JIM4	0.997
JIM17	0.997
JIM8	0.997
JIM15	0.999
CCRC-M78	0.999
JIM13	0.999
JIM7	0.999
JIM136	0.998
CCRC-M34	0.987
LM7	0.991
CCRC-M38	0.999
JIM5	0.999
PAM1	0.980
CCRC-M35	1.000
CCRC-M14	0.998
CCRC-M36	0.999
JIM19	0.999
JIM12	1.000
JIM11	1.000
JIM20	1.000

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