PlantProbes supports the maintenance & distribution of over 30 rat monoclonal antibodies (rat Mabs) directed to plant cell wall glycans.

The rat Mabs have been generated & characterised by the Paul Knox Cell Wall Lab at the University of Leeds.

See below for the details & specificities of our rat Mabs.

See right for the costs of supply of rat hybridoma cell culture supernatants.

We also supply the 2F4 mouse monoclonal antibody to homogalacturonan (►1 ml costs 200 GBP), the PAM1 scFv to homogalacturonan (►50 µg costs 150 GBP) and CBM3a carbohydrate-binding module (CBM) directed to crystalline cellulose (►200 µg costs 200 GBP).

A shipping and handling charge of 30 GBP will be added to all orders. Express shipment by courier will cost an additional 60 to 90 GBP dependent on territory. To order please let us know by email or fax the items required, delivery and invoice addresses and a purchase order number if appropriate. Items can be paid for credit card (preferred) or by institutional invoice - ask for details.

New: Purified rat Mabs: LM5 galactan, LM6 arabinan, LM10 xylan and LM15 xyloglucan are now also available in 50 µg aliquots of purified immunoglobulins.

►Purified rat Mabs cost 220 GBP per 50 µg unit.

LM- RAT MONOCLONAL ANTIBODIES – clickable links to probes

Heteroxylan
Xyloglucan
Heteromannan

Pectin
Other glycans
Proteoglycans/glycoproteins

New, BAMs Brown algae cell walls – sulphated fucans/fucoidan

PlantProbes also maintains the cell lines, and can supply hybridoma cell culture supernatants, for a range of JIM-designated anti-arabinogalactan-protein (AGP) and anti-extensin rat Mabs that were isolated in the John Innes Institute from 1986-1991. These include: anti-AGP: JIM4 JIM8, JIM13, JIM14, JIM15 & JIM16 and anti-extensin: JIM11, JIM12, JIM19 & JIM20. We can also supply AGP antibody MAC207. See the Paul Knox Cell Wall Lab website at http://www.plantcellwalls.net for details of the specificities of these Mabs.
**Heteroxylan probes**

**LM10**
MONOCLONAL ANTIBODY to XYLAN / LM10 (Rat IgG2c)
SPECIFICITY: Generated using a neoglycoprotein (xylopentaose-BSA). It can recognise unsubstituted and relatively low-substituted xylans in several species. It has no cross-reactivity with wheat arabinoxylan.
► McCartney et al. (2005) J. Histochem. Cytochem 53, 543-546

**LM11**
MONOCLONAL ANTIBODY to XYLAN / ARABINOXYLAN / LM11 (Rat IgM)
SPECIFICITY: Generated using a neoglycoprotein (xylopentaose-BSA). It can recognise unsubstituted and relatively low-substituted xylans in several species. It can also accommodate more extensive substitution of a xylan backbone and binds strongly to wheat arabinoxylan.
► McCartney et al. (2005) J. Histochem. Cytochem 53, 543-546

**LM28**
MONOCLONAL ANTIBODY to GLUCURONOXYLAN / LM28 (Rat IgM)
SPECIFICITY: Generated using a complex pectic immunogen. The monoclonal antibody can recognise glucuronosyl substituted xylans in several species and MeGlcA is not required for recognition.

**LM27**
MONOCLONAL ANTIBODY to GRASS XYLAN PREPARATIONS / LM27 (Rat IgM)
SPECIFICITY: Generated using a complex pectic immunogen. Epitope is unknown but LM27 binds strongly to preparations of grass xylan/glucuronoxylan and is likely to be an epitope of a complex substitution of grass heteroxylan or an associated molecule.

**Xyloglucan probes**

**LM15**
MONOCLONAL ANTIBODY to XYLOGLUCAN / LM15 (Rat IgG2c)
SPECIFICITY: Generated using a neoglycoprotein incorporating the xylosylated heptasaccharide from tamarind xyloglucan (XXXG-BSA). It recognises the XXXG motif of xyloglucan in several species and can accommodate to some extent a single galactosyl residue.
► Marcus et al. (2008) BMC Plant Biology 8:60

**LM24**
MONOCLONAL ANTIBODY to XYLOGLUCAN / LM24, (Rat IgG2a),
SPECIFICITY: Generated using a neoglycoprotein incorporating the xylosylated/galactosylated oligosaccharides from tamarind xyloglucan (XXLG & XLLG). It binds preferentially to the galactosylated XLLG oligosaccharide motif.
► Pedersen et al. (2012) J. Biol Chem. 47, 39429–39438

**LM25**
MONOCLONAL ANTIBODY to XYLOGLUCAN / LM25, (Rat IgM),
SPECIFICITY: Generated using a neoglycoprotein incorporating the xylosylated/galactosylated oligosaccharides from tamarind xyloglucan (XXLG & XLLG). It recognises a range of xyloglucan-specific oligosaccharide motifs in several species.
► Pedersen et al. (2012) J. Biol Chem. 47, 39429–39438

**Heteromannan probes**

**LM21**
MONOCLONAL ANTIBODY to HETEROMANNAN / LM21 (Rat IgM)
SPECIFICITY: This antibody recognises β-linked mannan polysaccharides of plant cell walls. It has no known cross-reactivity with other polymers and can recognise heteromannan polysaccharides in several species. LM21 binds effectively to β-(1→4)-manno-oligosaccharides from DP2 to DP5. LM21 displays a wide recognition of mannan, glucomannan and galactomannan polysaccharides.
► Marcus et al. (2010) Plant Journal 64, 191-203
**LM22**
**MONOCLONAL ANTIBODY to HETEROMANNAN / LM22 (Rat IgM)**
*SPECIFICITY:* This antibody recognises β-linked mannan polysaccharides of plant cell walls. It has no known cross-reactivity with other polymers and can recognise heteromannan polysaccharides in several species. LM22 binds effectively to β-(1–4)-manno-oligosaccharides from DP2 to DP5. LM22 displays recognition of mannan and glucomannan polymers although the basis of its lack of recognition of galactomannan polysaccharides is not clear. 
▶ Marcus et al. (2010) Plant Journal 64, 191-203

**Pectin probes**

**JIM5**
**MONOCLONAL ANTIBODY to HOMOGALACTURONAN / JIM5 (Rat IgG)**
*SPECIFICITY:* The antibody recognises the homogalacturonan domain of pectic polysaccharides. It has no known cross-reactivity with other polymers. It can recognise pectic polysaccharides in several species. The antibody recognises partially methyl-esterified epitopes of homogalacturonan and can also bind to un-esterified homogalacturonan. We now recommend the use of LM19 in the place of JIM5 as LM19 binds more effectively to unesterified HG.

**JIM7**
**MONOCLONAL ANTIBODY to HOMOGALACTURONAN / JIM7, (Rat IgA)**
*SPECIFICITY:* The antibody recognises homogalacturonan polysaccharides and has no known cross-reactivity with other polymers. The antibody recognises partially methyl-esterified epitopes of homogalacturonan but does not bind to un-esterified homogalacturonan. We now recommend the use of LM20 as an antibody probe for methyl-esterified homogalacturonan. JIM7 can be a good general probe for pectic homogalacturonan.

**LM7**
**MONOCLONAL ANTIBODY to HOMOGALACTURONAN / LM7 (Rat IgM)**
*SPECIFICITY:* The antibody recognises the homogalacturonan domain of pectic polysaccharides. It can recognise pectic polysaccharides in several species. The antibody recognises a partially methyl-esterified epitope of HG that results from non-blockwise de-esterification processes. It does not bind to un-esterified homogalacturonan.

**LM18**
**MONOCLONAL ANTIBODY to HOMOGALACTURONAN / LM18 (Rat IgG2c)**
*SPECIFICITY:* The antibody recognises the homogalacturonan domain of pectic polysaccharides. It has no known cross-reactivity with other polymers. It can recognise pectic polysaccharides in several species. The antibody has some preference for partially methyl-esterified homogalacturonan but can also bind to un-esterified homogalacturonan. ▶ Verhertbruggen et al. (2009) Carbohydr. Res. 344, 1858–1862

**LM19**
**MONOCLONAL ANTIBODY to HOMOGALACTURONAN / LM19 (Rat IgM)**
*SPECIFICITY:* The antibody recognises the homogalacturonan domain of pectic polysaccharides. It has no known cross-reactivity with other polymers. It can recognise pectic polysaccharides in several species. The antibody recognises a range of homogalacturonan samples but appears to have a preference for and binds strongly to un-esterified homogalacturonan. We now recommend the use of LM19 in the place of JIM5 as LM19 binds more effectively to unesterified HG. ▶ Verhertbruggen et al. (2009) Carbohydr. Res. 344, 1858–1862

**LM20**
**MONOCLONAL ANTIBODY to HOMOGALACTURONAN / LM20 (Rat IgM)**
*SPECIFICITY:* The antibody recognises the homogalacturonan domain of pectic polysaccharides. It has no known cross-reactivity with other polymers. It can recognise pectic polysaccharides in several species. The antibody requires methyl-esters for recognition of homogalacturonan and does not bind to un-esterified homogalacturonan. We now recommend the use of LM20 in the place of JIM7 as LM20 binding is more effectively lost by high pH treatments that remove HG methyl esters. ▶ Verhertbruggen et al. (2009) Carbohydr. Res. 344, 1858–1862
LM8
MONOCLONAL ANTIBODY to XYLOGALACTURONAN / LM8 (Rat IgM)
SPECIFICITY: The antibody recognises a specific epitope of a xylogalacturonan pectic polysaccharide that is associated with cell detachment and separation in a wide range of species. It has no known cross-reactivity with other polymers. This antibody does NOT bind to all xylogalacturonans. ►Willats et al. (2004) Planta, 218, 673-681

LM5
MONOCLONAL ANTIBODY to (1-4)-β-D-GALACTAN / LM5 (Rat IgG),
SPECIFICITY: The antibody was generated using a neoglycoprotein (galactotetraose-BSA). It recognises a linear tetrasaccharide in (1-4)-β-D-galactans. It has no cross-reactivity with (1-3)-β-D-galactans or (1-6)-β-D-galactans. It can recognise pectic polysaccharides in several species. In competitive inhibition ELISA, antibody binding to (1-4)-β-D-galactan was inhibited (50%) by 58 µg/ml (1-4)-β-D-galactotetraose and by 0.7 µg/ml lupin (1-4)-β-D-galactan. ►Jones et al. (1997) Plant Physiol. 113, 1405-1412

LM9
MONOCLONAL ANTIBODY to FERULOYLATED-(1-4)-β-D-GALACTAN / LM9 (Rat IgM)
SPECIFICITY: The antibody recognises a specific epitope of a feruloylated-(1-4)-β-D-galactan that is a structural feature of the pectic polymers of plant species of the Amaranthaceae/Chenopodiaceae. It has no known cross-reactivity with other polymers. In competitive inhibition ELISAs, antibody binding to sugar beet pectin was inhibited (50%) by 15 µg/ml O-[6-O-(trans-feruloyl)-β-D-galactopyranosyl]-α-L-arabinopyranose. ►Clausen et al. (2004) Planta, 219, 1036-1041

LM6
MONOCLONAL ANTIBODY to (1-5)-α-L-ARABINAN / LM6 (Rat IgG)
SPECIFICITY: Generated using a neoglycoprotein (arabinohexaose-BSA). Recognises a linear pentasaccharide in (1-5)-α-L-arabinans. It can recognise pectic polysaccharides in several species. It has no cross-reactivity with gum arabic but it may recognize arabinoalgalectan-proteins (AGPs) in some species. In competitive inhibition ELISAs, antibody binding to (1-5)-α-L-arabinan was inhibited (50%) by 40 ng/ml (1-5)-α-L-arabinopentaose and 19 ng/ml (1-5)-α-L-arabinohexaose. ►Willats et al. (1998) Carbohydr. Res. 308, 149-152

LM13
MONOCLONAL ANTIBODY to (1-5)-α-L-ARABINAN (linear) / LM13 (Rat IgM)
SPECIFICITY: Isolated from a high throughput screen of antibodies generated subsequent to immunization with a pectic fraction. Recognises a linear epitope in (1-5)-α-L-arabinans. Antibody recognition of arabinans increases with arabinofuranosidase action. This antibody binds to a specific subset of pectic arabinans, and to longer stretches of 1,5-linked arabinosyl residues that are likely to be more abundant in unbranched arabinans. The binding of LM13 is highly sensitive to arabinanase action. ►Moller et al. (2007) Glycoconjugate J. 25, 37-48 ►Verhertbruggen et al. (2009) Plant J. 59, 413-425.

LM16
MONOCLONAL ANTIBODY to PROCESSED ARABINAN RG-I / LM16 (Rat IgM)
SPECIFICITY: Generated subsequent to immunization with a pectic fraction. Recognises an epitope associated with arabinans and can be generated by arabinofuranosidase action and the loss of arabinosyl residues. The binding of LM16 is sensitive to galactosidase action and the epitope may involve galactosyl residue(s) on RG backbone. ►Verhertbruggen et al. (2009) Plant J. 59, 413-425

Other Glycan Probes

Cat. No. LM12
MONOCLONAL ANTIBODY to FERULOYLATED POLYMERS / LM12 (Rat IgG2c)
SPECIFICITY: The antibody recognises an epitope containing ferulic acid that is a structural feature of the pectic polymers of plant species of the Amaranthaceae/Chenopodiaceae AND also of the heteroxylan polymers of commelinid monocotyledons. It has no known cross-reactivity with non-feruloylated polymers outside these taxonomic groups. ►Pedersen et al. (2012) J. Biol Chem. 47, 39429–39438

Cat. No. LM23
MONOCLONAL ANTIBODY to XYLOSYL / LM23 (Rat IgM)
Glycoprotein probes

LM1
MONOCLONAL ANTIBODY to EXTENSIN / LM1 (Rat IgM)
SPECIFICITY: Generated to rice extensin hydroxyproline-rich glycoproteins (HRGPs). The antibody recognises an epitope that is carried by a range of HRGPs of the extensin class in a wide range of angiosperm species. The LM1 epitope most likely includes glycan components of extensins.

LM2
MONOCLONAL ANTIBODY to ARABINOGLACTAN-PROTEIN / LM2 (Rat IgM)
SPECIFICITY: Generated to rice arabinogalactan-proteins (AGPs). Recognises a carbohydrate epitope containing β-linked glucuronic acid. It can recognise AGPs in several species. In competitive inhibition ELISAs antibody binding to gum arabic was inhibited (50%) by 70 mg/ml 1-O-methyl-β-D-GlcA. The binding of the antibody to AGPs can be fully inhibited by 10 mM 1-O-methyl-β-D-GlcA.

LM14
MONOCLONAL ANTIBODY to ARABINOGLACTAN-PROTEIN / LM14, (Rat IgM)
SPECIFICITY: Isolated from a high throughput screen of antibodies generated subsequent to immunization with a pectic fraction. Recognizes arabinogalactan-proteins and will also bind to larch arabinogalactan. It can recognise AGPs in several species.

Brown algae cell wall polysaccharide probes

BAM1
MONOCLONAL ANTIBODY to NON-SULFATED EPITOPE of SULFATED FUCAN/FUCOIDAN PREPARATIONS / BAM1 (Rat IgM)
SPECIFICITY: Generated using an immunogen of fucoidan (Sigma-Aldrich F5631) coupled to BSA. BAM1 binds to a non-sulfated epitope, structure unknown, in preparations of fucoidans/sulfated fucans with no known cross-reactivity with other polysaccharides.

BAM2
MONOCLONAL ANTIBODY to SULFATED FUCAN/FUCOIDAN PREPARATIONS / BAM2 (Rat IgM)
SPECIFICITY: Generated using an immunogen of fucoidan (Sigma-Aldrich F5631) coupled to BSA. BAM2 binds to a sulfated epitope, structure unknown, in preparations of fucoidans/sulfated fucans with no known cross-reactivity with other polysaccharides.

BAM3
MONOCLONAL ANTIBODY to SULFATED FUCAN/FUCOIDAN PREPARATIONS / BAM3 (Rat IgM)
SPECIFICITY: Generated using an immunogen of fucoidan (Sigma-Aldrich F5631) coupled to BSA. BAM3 binds to a sulfated epitope, structure unknown, in preparations of fucoidans/sulfated fucans with no known cross-reactivity with other polysaccharides.

BAM4
MONOCLONAL ANTIBODY to SULPHATED EPITOPE of FUCAN/FUCOIDAN PREPARATIONS / BAM4 (Rat IgM)
SPECIFICITY: Generated using an immunogen of fucoidan (Sigma-Aldrich F5631) coupled to BSA. BAM4 binds to a sulfated epitope, structure unknown, in preparations of fucoidans/sulfated fucans with no known cross-reactivity with other polysaccharides. The BAM4 epitope is highly sensitive to de-sulfation procedures.

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