**Table S6 Blast search of the genome sequence assembly for carbohydrate metabolic genes in *Lupinus angustifolius.*** Genes showing SLG and SNP markers indicate that the scaffolds bearing the gene sequence were integrated into the sequenced-defined map.

|  |  |  |  |
| --- | --- | --- | --- |
| **Scalffold name** | **Annotation** | **SLG** | **Marker names** |
| **Galactan biosynthesis** |  |  |
| scaffold71643 | Galactosyl transferase GMA12/MNN10 family protein |
| scaffold66319 | Galactosyl transferase GMA12/MNN10 family protein |
| scaffold84627 | Galactosyl transferase GMA12/MNN10 family protein |
| scaffold94955 | Galactosyl transferase GMA12/MNN10 family protein |
| scaffold1671 | Galactosyltransferase family protein |  |  |
| scaffold92549 | Galactosyltransferase family protein |  |  |
| scaffold30224 | Galactosyltransferase family protein |  |  |
| scaffold2992 | Galactosyltransferase family protein | SLG1 | AntjM2 |
| scaffold2992 | Galactosyltransferase family protein | SLG1 | DAFWA6620 |
| scaffold72257 | Galactosyltransferase family protein | SLG11 | DAFWA6249 |
| scaffold93179 | Galactosyltransferase family protein |  |  |
| scaffold42595 | Galactosyltransferase family protein |  |  |
| scaffold428 | Galactosyltransferase family protein |  |  |
| scaffold38882 | Galactosyltransferase family protein |  |  |
| scaffold7907 | Galactosyltransferase family protein |  |  |
| scaffold97670 | Galactosyltransferase family protein |  |  |
| scaffold22891 | Galactosyltransferase family protein |  |  |
| scaffold19344 | Galactosyltransferase family protein |  |  |
| C28716854 | Galactosyltransferase family protein |  |  |
| scaffold2965 | Galactosyltransferase family protein |  |  |
| scaffold3770 | Galactosyltransferase family protein |  |  |
| scaffold20622 | Galactosyltransferase family protein |  |  |
| scaffold96325 | Galactosyltransferase family protein |  |  |
| scaffold57641 | Galactosyltransferase family protein |  |  |
| scaffold33715 | Galactosyltransferase family protein |  |  |
| scaffold77013 | Galactosyltransferase family protein |  |  |
| scaffold48513 | Galactosyltransferase family protein |  |  |
| scaffold47824 | Galactosyltransferase family protein |  |  |
| scaffold92081 | Galactosyltransferase family protein |  |  |
| scaffold11466 | Galactosyltransferase family protein |  |  |
| scaffold71952 | Galactosyltransferase family protein |  |  |
| scaffold97243 | Galactosyltransferase family protein |  |  |
| scaffold7791 | Galactosyltransferase family protein |  |  |
| scaffold11638 | Galactosyltransferase family protein |  |  |
| **Galactan hydrolysis** |  |  |
| scaffold89129 | alpha-galactosidase 2 |  |  |
| scaffold2022 | alpha-galactosidase 2 |  |  |
| scaffold26984 | alpha-galactosidase 2 |  |  |
| scaffold28589 | alpha-galactosidase 2 |  |  |
| scaffold21535 | beta-galactosidase 10 |  |  |
| scaffold25426 | beta-galactosidase 12 |  |  |
| scaffold48561 | beta-galactosidase 17 | SLG4 | iDAFWA656 |
| scaffold48561 | beta-galactosidase 17 | SLG4 | DAFWA6654 |
| scaffold10163 | beta-galactosidase 3 |  |  |
| scaffold34199 | beta-galactosidase 3 |  |  |
| scaffold54725 | beta-galactosidase 3 |  |  |
| scaffold95598 | beta-galactosidase 3 | SLG9 | DAFWA8129 |
| scaffold95598 | beta-galactosidase 3 | SLG9 | DAFWA1401 |
| scaffold936 | beta-galactosidase 3 |  |  |
| scaffold47980 | beta-galactosidase 3 |  |  |
| scaffold47142 | beta-galactosidase 3 |  |  |
| scaffold13641 | beta-galactosidase 5 |  |  |
| scaffold21927 | beta-galactosidase 5 |  |  |
| scaffold71273 | beta-galactosidase 7 |  |  |
| scaffold91038 | beta-galactosidase 7 | SLG1 | DAFWA7233 |
| scaffold77921 | beta-galactosidase 8 | SLG4 | DAFWA1958 |
| scaffold77921 | beta-galactosidase 8 | SLG4 | DAFWA683 |
| scaffold77921 | beta-galactosidase 8 | SLG4 | DAFWA1572 |
| scaffold67899 | beta-galactosidase 8 |  |  |
| scaffold89508 | beta-galactosidase 8 | SLG7 | DAFWA6648 |
| scaffold89508 | beta-galactosidase 8 | SLG7 | DAFWA7405 |
| scaffold89508 | beta-galactosidase 8 | SLG7 | DAFWA2067 |
| scaffold49286 | beta galactosidase 1 | SLG4 | DAFWA8402 |
| scaffold61537 | beta galactosidase 1 |  |  |
| scaffold95935 | beta galactosidase 9 |  |  |
| C28703208 | beta galactosidase 9 |  |  |
| scaffold24548 | beta galactosidase 9 |  |  |
| **Cellulose Biosynthesis** |  |  |
| C28753894 | cellulose synthase 1 |  |  |
| scaffold98153 | cellulose synthase 1 |  |  |
| scaffold26856 | cellulose synthase 6 |  |  |
| scaffold87609 | cellulose synthase 6 |  |  |
| scaffold77336 | cellulose synthase 6 |  |  |
| scaffold94513 | cellulose synthase 6 |  |  |
| scaffold36074 | cellulose synthase 6 |  |  |
| scaffold64353 | cellulose synthase 6 |  |  |
| scaffold88213 | cellulose synthase A4 | SLG3 | DAFWA1860 |
| scaffold88213 | cellulose synthase A4 | SLG3 | DAFWA3353 |
| scaffold88213 | cellulose synthase A4 | SLG3 | DAFWA1730 |
| scaffold17741 | cellulose synthase A4 |  |  |
| scaffold85715 | Cellulose synthase family protein | SLG4 | DAFWA3848 |
| scaffold18216 | Cellulose synthase family protein |  |  |
| scaffold63375 | cellulose synthase family protein |  |  |
| scaffold68825 | Cellulose synthase family protein |  |  |
| scaffold70626 | Cellulose synthase family protein |  |  |
| scaffold70196 | Cellulose synthase family protein |  |  |
| scaffold82169 | Cellulose synthase family protein |  |  |
| scaffold23824 | Cellulose synthase family protein |  |  |
| **HemiCellulose biosynthesis** |  |  |
| scaffold3328 | cellulose synthase like D4 |  |  |
| scaffold39387 | cellulose synthase like D4 | SLG20 | DAFWA7520 |
| scaffold8374 | cellulose synthase like E1 |  |  |
| scaffold28041 | cellulose synthase like E1 |  |  |
| scaffold1820 | cellulose synthase like G1 |  |  |
| C28634930 | cellulose synthase like G2 |  |  |
| scaffold84882 | cellulose synthase-like A02 | SLG7 | DAFWA1377 |
| scaffold65124 | cellulose synthase-like A02 |  |  |
| scaffold84882 | cellulose synthase-like A02 | SLG7 | DAFWA6661 |
| scaffold70522 | cellulose synthase-like A02 |  |  |
| scaffold84882 | cellulose synthase-like A02 | SLG7 | iDAFWA534 |
| scaffold35157 | cellulose synthase-like A02 | SLG1 | DAFWA7012 |
| scaffold35157 | cellulose synthase-like A02 | SLG1 | DAFWA6646 |
| scaffold35157 | cellulose synthase-like A02 | SLG1 | DAFWA8678 |
| scaffold84882 | cellulose synthase-like A02 | SLG7 | DAFWA6684 |
| scaffold84882 | cellulose synthase-like A02 | SLG7 | DAFWA4082 |
| scaffold90138 | cellulose synthase-like B4 |  |  |
| scaffold60932 | cellulose synthase-like B4 |  |  |
| scaffold75580 | cellulose synthase-like B4 |  |  |
| scaffold75686 | cellulose synthase-like B4 |  |  |
| scaffold97687 | cellulose synthase-like D1 |  |  |
| scaffold73927 | cellulose synthase-like D3 |  |  |
| scaffold47935 | cellulose synthase-like D3 |  |  |
| scaffold45357 | cellulose synthase-like D3 |  |  |
| scaffold84654 | Cellulose-synthase-like C12 |  |  |
| scaffold88679 | Cellulose-synthase-like C12 |  |  |
| scaffold91140 | Cellulose-synthase-like C12 |  |  |
| scaffold70917 | Cellulose-synthase-like C12 |  |  |
| scaffold52979 | Cellulose-synthase-like C12 |  |  |
| scaffold79191 | Cellulose-synthase-like C12 |  |  |
| scaffold97660 | Cellulose-synthase-like C12 |  |  |
| scaffold71133 | Cellulose-synthase-like C12 |  |  |
| scaffold20757 | Cellulose-synthase-like C4 |  |  |
| scaffold48089 | Cellulose-synthase-like C5 |  |  |
| scaffold42844 | Cellulose-synthase-like C6 |  |  |
| scaffold83766 | Cellulose-synthase-like C6 |  |  |
| **Pectin biosynthesis and degradation** |  |  |
| scaffold77431 | Pectin lyase-like superfamily protein | SLG4 | DAFWA8236 |
| scaffold69954 | Pectin lyase-like superfamily protein |  |  |
| scaffold77431 | Pectin lyase-like superfamily protein | SLG4 | DAFWA6152 |
| C28542412 | Pectin lyase-like superfamily protein |  |  |
| scaffold85000 | Pectin lyase-like superfamily protein |  |  |
| scaffold4901 | Pectin lyase-like superfamily protein | SLG2 | DAFWA4571 |
| scaffold80858 | Pectin lyase-like superfamily protein |  |  |
| scaffold96299 | Pectin lyase-like superfamily protein |  |  |
| C27517231 | Pectin lyase-like superfamily protein |  |  |
| C28504236 | Pectin lyase-like superfamily protein |  |  |
| C27523027 | Pectin lyase-like superfamily protein |  |  |
| scaffold35813 | Pectin lyase-like superfamily protein |  |  |
| scaffold60006 | Pectin lyase-like superfamily protein |  |  |
| scaffold97324 | Pectin lyase-like superfamily protein | SLG13 | DAFWA5798 |
| scaffold25145 | Pectin lyase-like superfamily protein |  |  |
| scaffold96760 | Pectin lyase-like superfamily protein | SLG7 | DAFWA5638 |
| scaffold86613 | Pectin lyase-like superfamily protein |  |  |
| scaffold33236 | Pectin lyase-like superfamily protein | SLG8 | DAFWA329 |
| scaffold90800 | Pectin lyase-like superfamily protein |  |  |
| scaffold33555 | Pectin lyase-like superfamily protein | SLG2 | DAFWA5230 |
| scaffold76840 | Pectin lyase-like superfamily protein |  |  |
| scaffold83776 | Pectin lyase-like superfamily protein |  |  |
| scaffold96760 | Pectin lyase-like superfamily protein | SLG7 | DAFWA2541 |
| scaffold10776 | Pectin lyase-like superfamily protein |  |  |
| scaffold96627 | Pectin lyase-like superfamily protein |  |  |
| scaffold34311 | Pectin lyase-like superfamily protein |  |  |
| scaffold3456 | Pectin lyase-like superfamily protein |  |  |
| scaffold31808 | Pectin lyase-like superfamily protein |  |  |
| scaffold76629 | Pectin lyase-like superfamily protein |  |  |
| scaffold83717 | Pectin lyase-like superfamily protein |  |  |
| scaffold85194 | Pectin lyase-like superfamily protein |  |  |
| scaffold98305 | Pectin lyase-like superfamily protein |  |  |
| scaffold86807 | Pectin lyase-like superfamily protein |  |  |
| scaffold80069 | Pectin lyase-like superfamily protein | SLG7 | DAFWA6507 |
| scaffold2680 | Pectin lyase-like superfamily protein | SLG1 | DAFWA3385 |
| scaffold2680 | Pectin lyase-like superfamily protein | SLG1 | DAFWA5893 |
| scaffold2680 | Pectin lyase-like superfamily protein | SLG1 | DAFWA5196 |
| scaffold80069 | Pectin lyase-like superfamily protein | SLG7 | DAFWA4688 |
| scaffold65717 | Pectin lyase-like superfamily protein |  |  |
| scaffold80069 | Pectin lyase-like superfamily protein | SLG7 | DAFWA1082 |
| scaffold53502 | Pectin lyase-like superfamily protein |  |  |
| scaffold80069 | Pectin lyase-like superfamily protein | SLG7 | DAFWA6038 |
| C28702346 | Pectin lyase-like superfamily protein |  |  |
| scaffold98347 | Pectin lyase-like superfamily protein |  |  |
| scaffold98350 | Pectin lyase-like superfamily protein | SLG6 | DAFWA1225 |
| scaffold532 | Pectin lyase-like superfamily protein | SLG2 | iDAFWA381 |
| C27863913 | Pectin lyase-like superfamily protein |  |  |
| scaffold532 | Pectin lyase-like superfamily protein | SLG2 | DAFWA4751 |
| scaffold92983 | Pectin lyase-like superfamily protein |  |  |
| C28205085 | Pectin lyase-like superfamily protein |  |  |
| C28204033 | Pectin lyase-like superfamily protein |  |  |
| scaffold65514 | Pectin lyase-like superfamily protein |  |  |
| scaffold90834 | Pectin lyase-like superfamily protein |  |  |
| scaffold92314 | Pectin lyase-like superfamily protein |  |  |
| scaffold49638 | Pectin lyase-like superfamily protein | SLG14 | DAFWA7450 |
| scaffold68746 | Pectin lyase-like superfamily protein | SLG17 | DAFWA8547 |
| scaffold25389 | Pectin lyase-like superfamily protein |  |  |
| scaffold93599 | Pectin lyase-like superfamily protein |  |  |
| scaffold64060 | Pectin lyase-like superfamily protein |  |  |
| C28406540 | Pectin lyase-like superfamily protein |  |  |
| scaffold96760 | Pectin lyase-like superfamily protein | SLG7 | DAFWA3978 |
| scaffold52451 | Pectin lyase-like superfamily protein |  |  |
| scaffold84186 | Pectin lyase-like superfamily protein |  |  |
| scaffold51663 | Pectin lyase-like superfamily protein |  |  |
| scaffold97630 | Pectin lyase-like superfamily protein |  |  |
| scaffold97638 | Pectin lyase-like superfamily protein |  |  |
| scaffold87678 | Pectin lyase-like superfamily protein | SLG2 | DAFWA7284 |
| scaffold67758 | Pectin lyase-like superfamily protein |  |  |
| scaffold84222 | Pectin lyase-like superfamily protein |  |  |
| scaffold92399 | Pectin lyase-like superfamily protein |  |  |
| C28369954 | Pectin lyase-like superfamily protein |  |  |
| scaffold5972 | Pectin lyase-like superfamily protein |  |  |
| scaffold69181 | Pectin lyase-like superfamily protein |  |  |
| scaffold79013 | Pectin lyase-like superfamily protein |  |  |
| scaffold71143 | Pectin lyase-like superfamily protein |  |  |
| scaffold74560 | Pectin lyase-like superfamily protein |  |  |
| scaffold74609 | Pectin lyase-like superfamily protein |  |  |
| scaffold89409 | Pectin lyase-like superfamily protein |  |  |
| scaffold33555 | Pectin lyase-like superfamily protein | SLG2 | DAFWA6604 |
| scaffold1240 | Pectin lyase-like superfamily protein |  |  |
| scaffold11693 | Pectin lyase-like superfamily protein | SLG2 | DAFWA6489 |
| scaffold898 | Pectin lyase-like superfamily protein |  |  |
| scaffold62426 | Pectin lyase-like superfamily protein | SLG6 | DAFWA6058 |
| scaffold44386 | Pectin lyase-like superfamily protein |  |  |
| scaffold62101 | Pectin lyase-like superfamily protein |  |  |
| scaffold38142 | Pectin lyase-like superfamily protein |  |  |
| scaffold85569 | Pectin lyase-like superfamily protein |  |  |
| scaffold92000 | Pectin lyase-like superfamily protein |  |  |
| scaffold38012 | Pectin lyase-like superfamily protein |  |  |
| scaffold61840 | Pectin lyase-like superfamily protein |  |  |
| scaffold45519 | Pectin lyase-like superfamily protein |  |  |
| scaffold92748 | Pectin lyase-like superfamily protein |  |  |
| scaffold40060 | Pectin lyase-like superfamily protein |  |  |
| scaffold88721 | Pectin lyase-like superfamily protein |  |  |
| C27865679 | Pectin lyase-like superfamily protein |  |  |
| scaffold73665 | Pectin lyase-like superfamily protein |  |  |
| scaffold41246 | Pectin lyase-like superfamily protein | SLG18 | iDAFWA243 |
| scaffold42812 | Pectin lyase-like superfamily protein |  |  |
| scaffold1712 | Pectin lyase-like superfamily protein |  |  |
| scaffold55746 | Pectin lyase-like superfamily protein |  |  |
| C28678236 | Pectin lyase-like superfamily protein |  |  |
| scaffold43558 | Pectin lyase-like superfamily protein |  |  |
| scaffold9909 | Pectin lyase-like superfamily protein |  |  |
| scaffold88836 | Pectin lyase-like superfamily protein |  |  |
| scaffold99400 | Pectin lyase-like superfamily protein |  |  |
| scaffold44126 | Pectin lyase-like superfamily protein |  |  |
| scaffold5598 | Pectin lyase-like superfamily protein | SLG13 | iDAFWA102 |
| scaffold55998 | Pectin lyase-like superfamily protein |  |  |
| scaffold94923 | Pectin lyase-like superfamily protein |  |  |
| scaffold11693 | Pectin lyase-like superfamily protein | SLG2 | DAFWA1770 |
| scaffold72094 | Pectin lyase-like superfamily protein |  |  |
| scaffold95421 | Pectin lyase-like superfamily protein |  |  |
| C28650762 | Pectin lyase-like superfamily protein |  |  |
| scaffold82738 | Pectin lyase-like superfamily protein |  |  |
| scaffold74940 | pectin methylesterase 1 |  |  |
| scaffold77251 | pectin methylesterase 3 |  |  |
| scaffold15666 | pectin methylesterase 3 | SLG2 | DAFWA4210 |
| scaffold72583 | pectin methylesterase 3 |  |  |
| scaffold62021 | pectin methylesterase 3 |  |  |
| scaffold3348 | pectin methylesterase inhibitor 1 |  |  |
| scaffold27292 | pectin methylesterase inhibitor 1 |  |  |
| scaffold20829 | pectin methylesterase inhibitor 1 |  |  |
| scaffold34511 | pectin methylesterase inhibitor 1 |  |  |
| scaffold67851 | pectin methylesterase inhibitor 1 |  |  |
| scaffold28908 | pectin methylesterase inhibitor 1 |  |  |
| scaffold98430 | pectin methylesterase inhibitor 1 |  |  |
| scaffold98417 | pectin methylesterase inhibitor 1 |  |  |
| scaffold50290 | pectin methylesterase inhibitor 1 |  |  |
| C28548972 | pectin methylesterase inhibitor 1 |  |  |
| scaffold85568 | pectin methylesterase PCR fragment F | SLG5 | iDAFWA633 |
| C28739410 | Pectinacetylesterase family protein | SLG13 | DAFWA7025 |
| C27601111 | Pectinacetylesterase family protein |  |  |
| scaffold81045 | Pectinacetylesterase family protein | SLG12 | DAFWA4757 |
| scaffold1329 | Pectinacetylesterase family protein | SLG2 | DAFWA4291 |
| scaffold71004 | Pectinacetylesterase family protein |  |  |
| scaffold43493 | Pectinacetylesterase family protein | SLG6 | DAFWA6871 |
| scaffold1329 | Pectinacetylesterase family protein | SLG2 | DAFWA3575 |
| scaffold1186 | Pectinacetylesterase family protein |  |  |
| scaffold1329 | Pectinacetylesterase family protein | SLG2 | DAFWA3985 |
| scaffold43493 | Pectinacetylesterase family protein | SLG6 | DAFWA4660 |
| scaffold89845 | Pectinacetylesterase family protein | SLG9 | DAFWA3347 |
| scaffold92653 | Pectinacetylesterase family protein |  |  |
| scaffold97326 | Pectinacetylesterase family protein |  |  |
| scaffold87390 | Pectinacetylesterase family protein |  |  |
| scaffold53467 | Pectinacetylesterase family protein |  |  |
| scaffold28761 | Pectinacetylesterase family protein | SLG6 | DAFWA5444 |
| scaffold81390 | Pectinacetylesterase family protein |  |  |
| scaffold2931 | Pectinacetylesterase family protein |  |  |
| scaffold16815 | Pectinacetylesterase family protein |  |  |
| scaffold89111 | Pectinacetylesterase family protein | SLG6 | DAFWA3080 |
| scaffold60519 | Pectinacetylesterase family protein |  |  |
| scaffold92099 | Pectinacetylesterase family protein |  |  |
| scaffold89111 | Pectinacetylesterase family protein | SLG6 | DAFWA6090 |
| scaffold19203 | Pectinacetylesterase family protein |  |  |
| scaffold89111 | Pectinacetylesterase family protein | SLG6 | DAFWA4484 |
| scaffold69443 | Pectinacetylesterase family protein |  |  |
| scaffold83471 | galacturonosyltransferase 1 |  |  |
| scaffold71636 | galacturonosyltransferase 1 | SLG1 | DAFWA2590 |
| scaffold24236 | galacturonosyltransferase 1 |  |  |
| scaffold15767 | galacturonosyltransferase 10 |  |  |
| scaffold95610 | galacturonosyltransferase 10 |  |  |
| scaffold76263 | galacturonosyltransferase 10 |  |  |
| scaffold73221 | galacturonosyltransferase 11 |  |  |
| scaffold32853 | galacturonosyltransferase 13 |  |  |
| scaffold4579 | galacturonosyltransferase 13 | SLG8 | DAFWA7446 |
| scaffold92874 | galacturonosyltransferase 13 |  |  |
| scaffold32854 | galacturonosyltransferase 13 |  |  |
| scaffold91548 | galacturonosyltransferase 13 |  |  |
| scaffold64896 | galacturonosyltransferase 15 | SLG2 | DAFWA4927 |
| scaffold92190 | galacturonosyltransferase 4 |  |  |
| scaffold81673 | galacturonosyltransferase 4 | SLG14 | DAFWA6986 |
| scaffold77369 | galacturonosyltransferase 4 |  |  |
| scaffold1445 | galacturonosyltransferase 6 |  |  |
| scaffold82764 | galacturonosyltransferase 7 | SLG1 | DAFWA4465 |
| scaffold66386 | galacturonosyltransferase 9 |  |  |
| scaffold71955 | galacturonosyltransferase-like 2 |  |  |
| scaffold55099 | galacturonosyltransferase-like 2 |  |  |
| scaffold5722 | galacturonosyltransferase-like 2 |  |  |
| scaffold72048 | galacturonosyltransferase-like 4 |  |  |
| scaffold83440 | galacturonosyltransferase-like 4 |  |  |
| scaffold21301 | galacturonosyltransferase-like 4 | SLG15 | DAFWA3235 |
| scaffold21301 | galacturonosyltransferase-like 4 | SLG15 | DAFWA2951 |