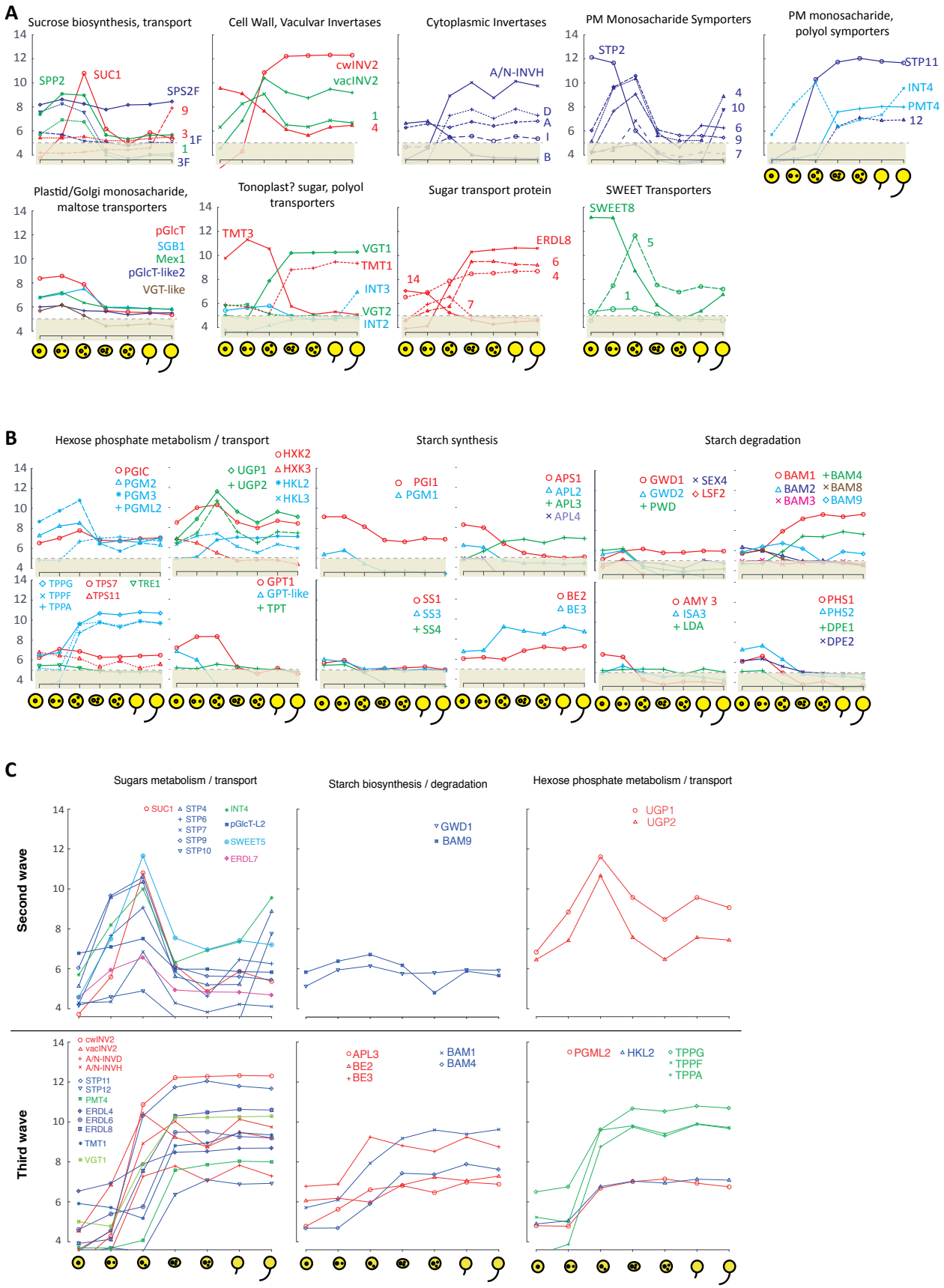

Supplemental Figure S1. Expression of carbohydrate transport and metabolism genes during pollen development. A. Expressions of sugar transport and metabolism genes. B. Expressions of hexose phosphate and starch transport and metabolism genes. C. The second and third carbohydrate gene expression clusters. Expression and co-expression values (log2-scale of expression values) are given for microspore development (first 4 x-axis ticks: microspore, bicellular, tricellular, and mature pollen grains), and during in vitro pollen tube growth (last 3 x-axis ticks: hydrated pollen grain, and 30 min and 240 min after germination). Refer to Table S1 for full names of the genes.

Supplemental Figure S2. Expression values (log2-scale) for hexose phosphate and starch metabolism gene during the developments of different flower and silique organs/tissues/cells (Figures S2.1-S2.6: pages 3-8). Comparing gene expression within the pollen grain and the chalazal region of the seed with other flower and seed organs/tissues/cells, some important specificities can be distinguished; we will report just few cases , which we consider important for our subject. First, the higher representation of gene members per pathway within some floral organs, as is the case for the whole flower or the carpel, might be explained by their higher tissue heterogeneity. Second there was a ubiquitous variation in the isoforms used in practically every step of both metabolic pathways between the different tissues/organs/cells. As an illustration we will comment on *APL* and *SS* isoforms. A predominance of *APL3* can be found within the stamen (together with *APL4*), the nectaries (together with APL2), and the seed. Based on our microscopical analysis, starch biosynthesis within reproductive cells was highest within the central cell and this seems to be paralleled by relatively higher expression levels of starch metabolism genes. Although the expression levels within these cells were generally lower compared to other flower and seed tissues, a predominance of *APL2* was observed within the MMC, the sperm cell or the egg cell whereas the predominance of *APL3* appears to characterize the central cell. The carpel and the pedicel were the only flower organs to show a relatively higher expression level of the mesophyll cells isoform *APL1* together with a high expression levels in *APL2*, *APL3*, and *APL4*. Concerning the starch synthase activity, while in the pollen grain no significant levels for *SS2* were found, the chalazal seed coat showed no significant transcript levels for *SS4*; and both organs showed no significant levels of the *GBSS*. Furthermore, only *SS1* showed some significant expression levels within generative reproductive cells.

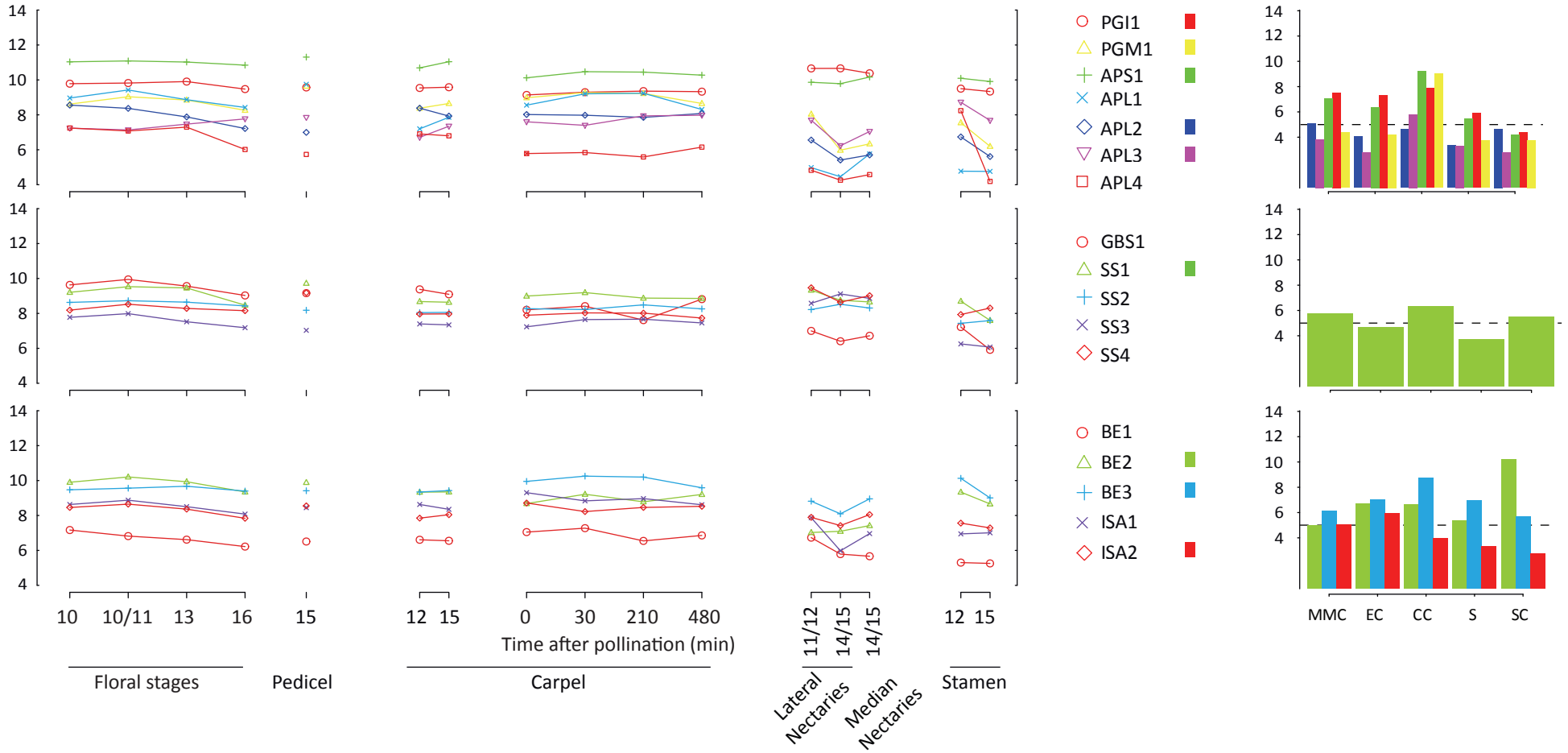

Figure S2.1 Transcript levels for starch synthesis genes at different floral stages, within different floral organs, within the carpel at different times after pollination, and within different gametic cells (MMC: megaspore mother cell, EC: egg cell, CC: central cell, S: synergid, SC: sperm cell).

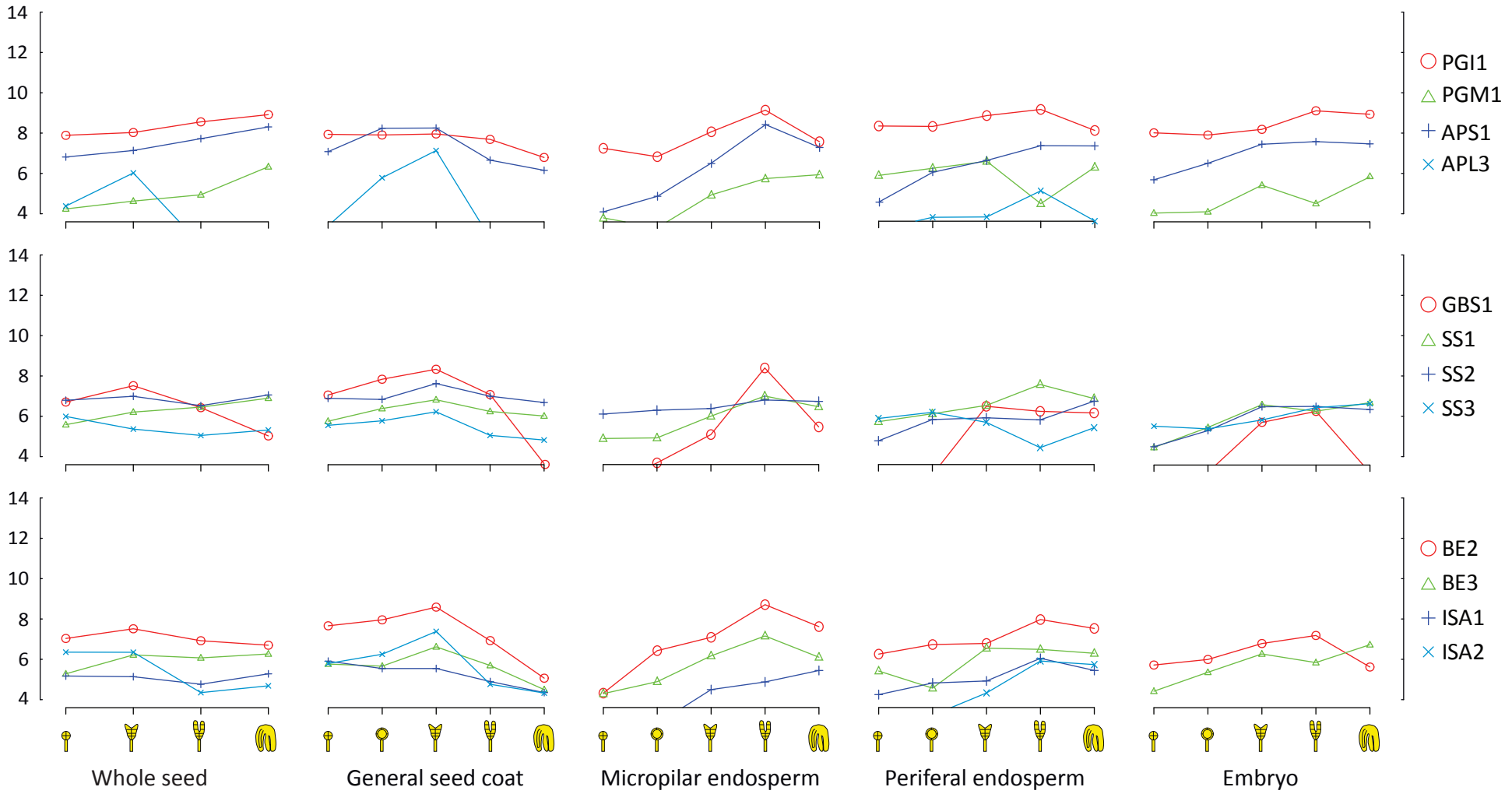

Figure S2.2 Transcript levels for starch synthesis genes at different whole seed, general seed coat, micropilar and periferal endosperm, and embryo developmental stages

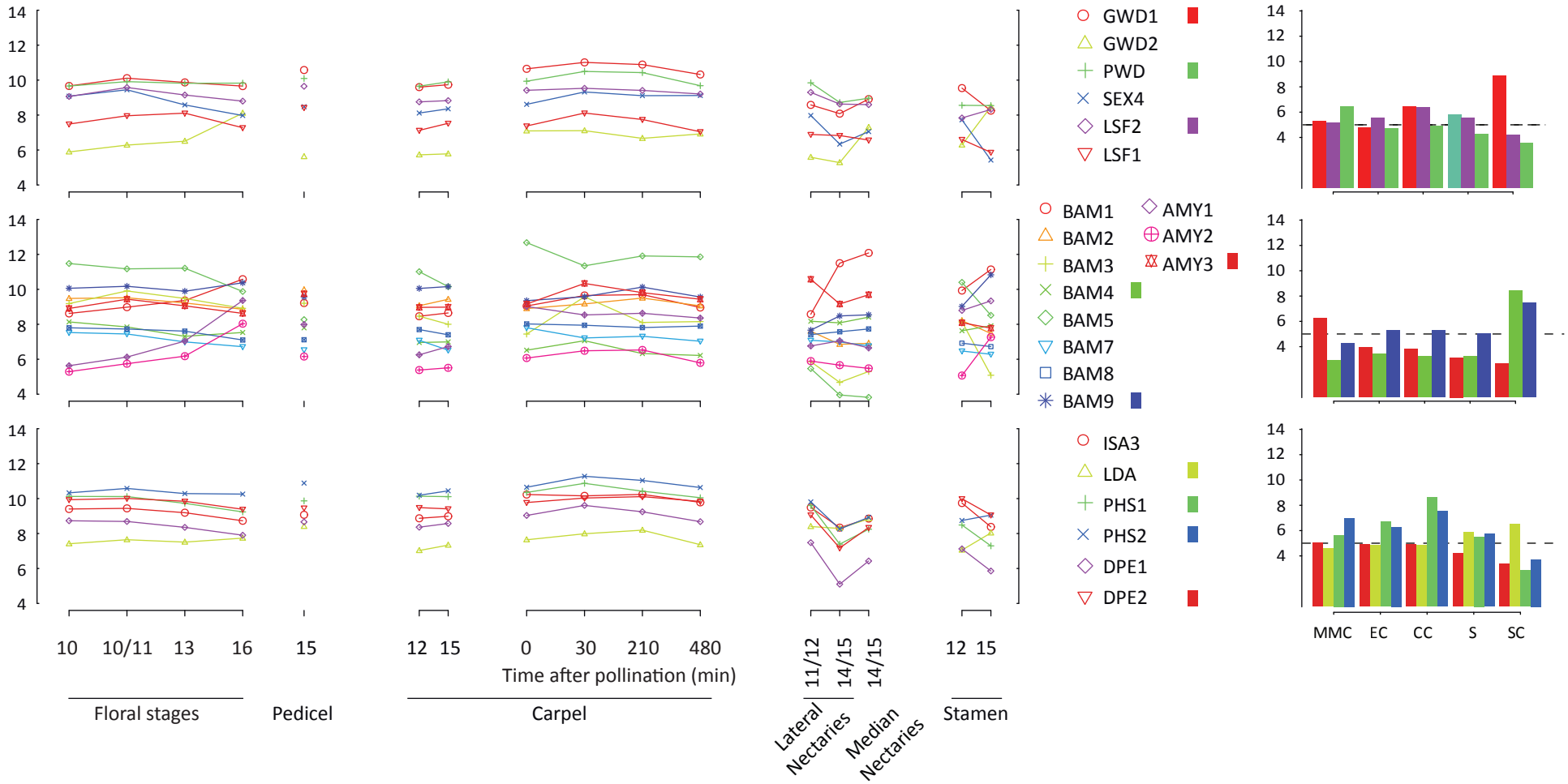

Figure S2.3 Transcript levels for starch degradation genes at different floral stages, within different floral organs, within the carpel at different times after pollination, and within different gametic cells (MMC: megaspore mother cell, EC: egg cell, CC: central cell, S: synergid, SC: sperm cell).

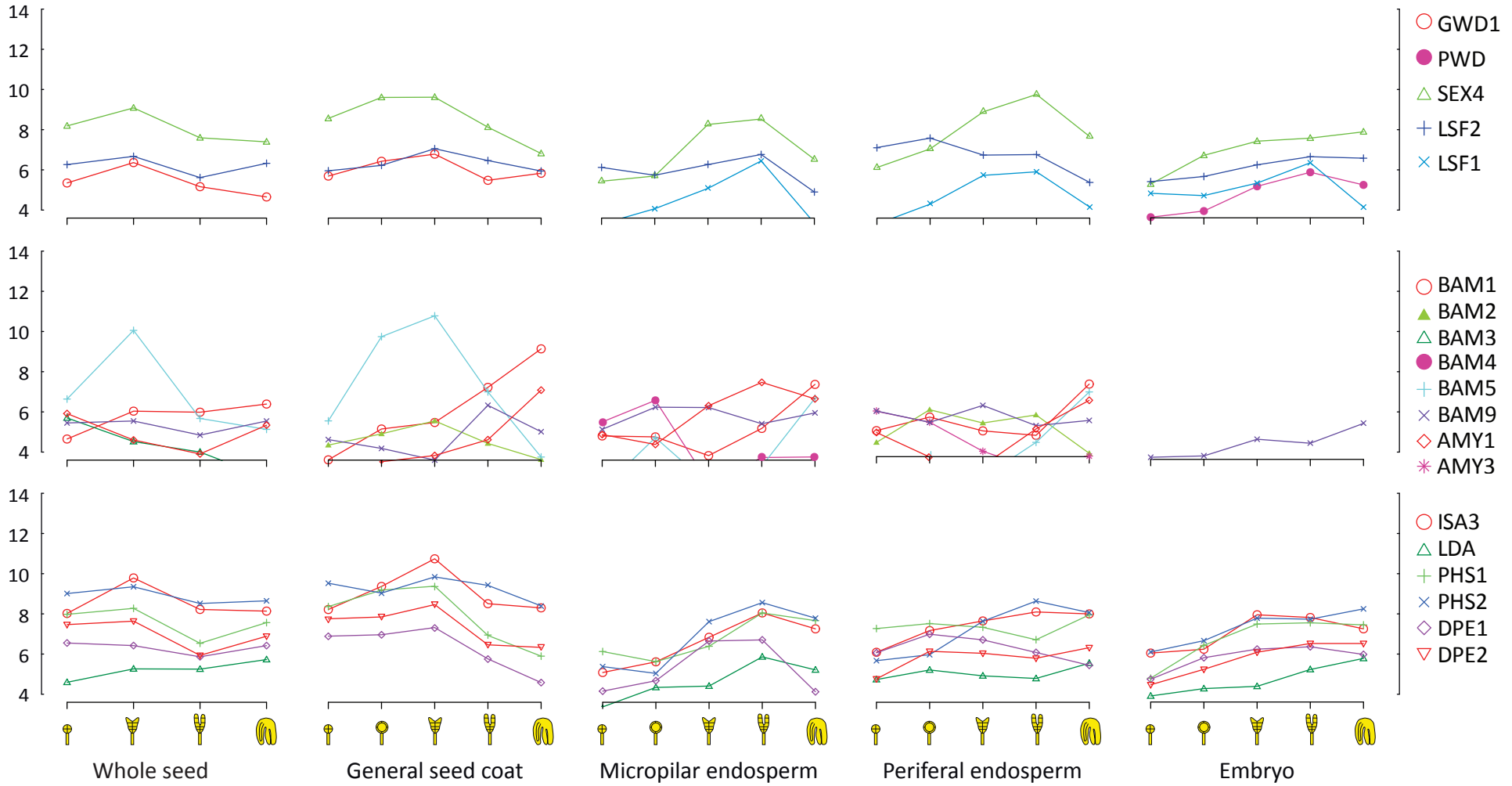

Figure S2.4 Transcript levels for starch degradation genes at different whole seed, general seed coat, micropilar and periferal endosperm, and embryo developmental stages

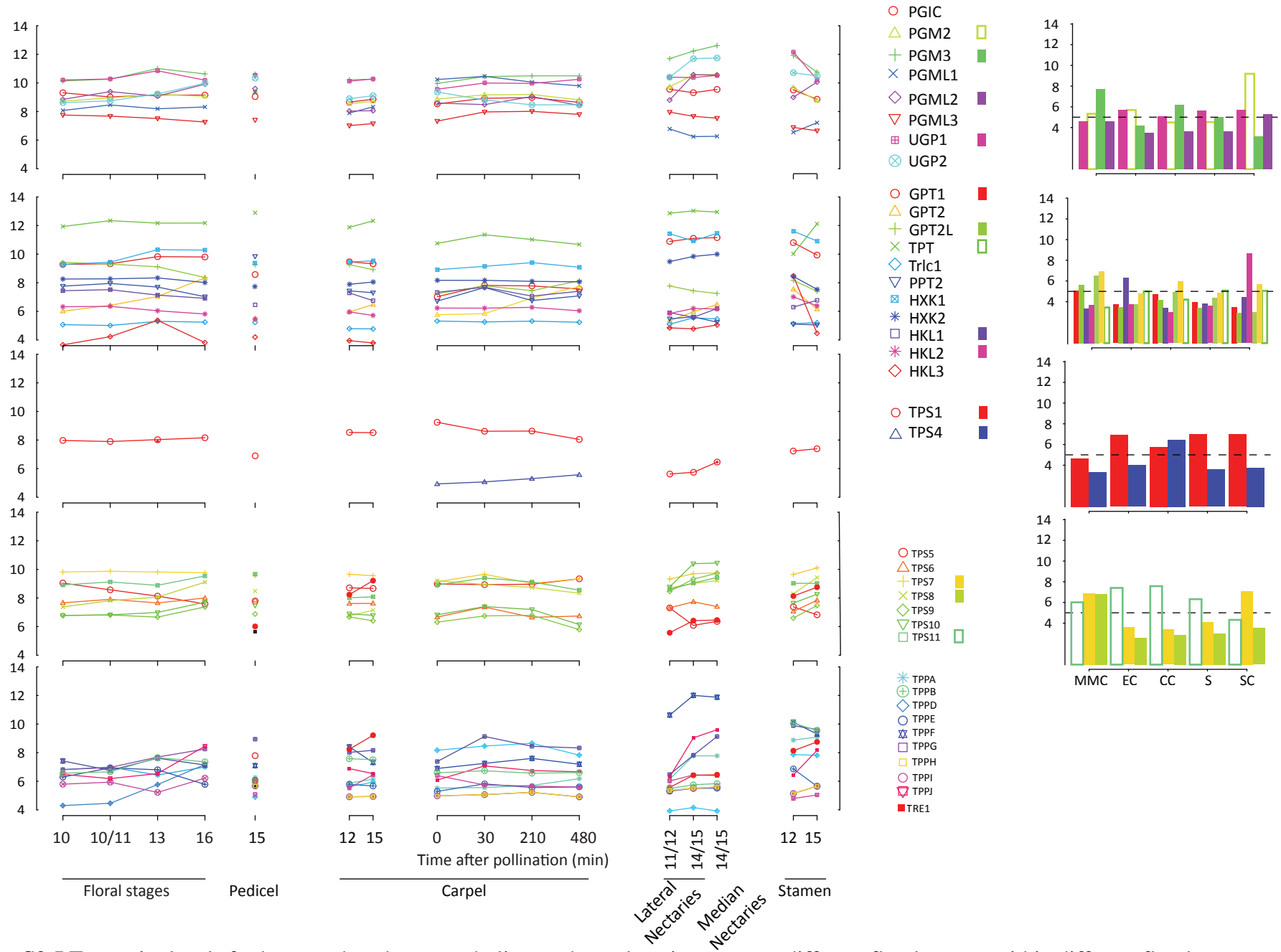

Figure S2.5 Transcript levels for hexose phosphate metabolism and translocation genes at different floral stages, within different floral organs, within the carpel at different times after pollination, and within different gametic cells (MMC: megaspore mother cell, EC: egg cell, CC: central cell, S: synergid, SC: sperm cell).

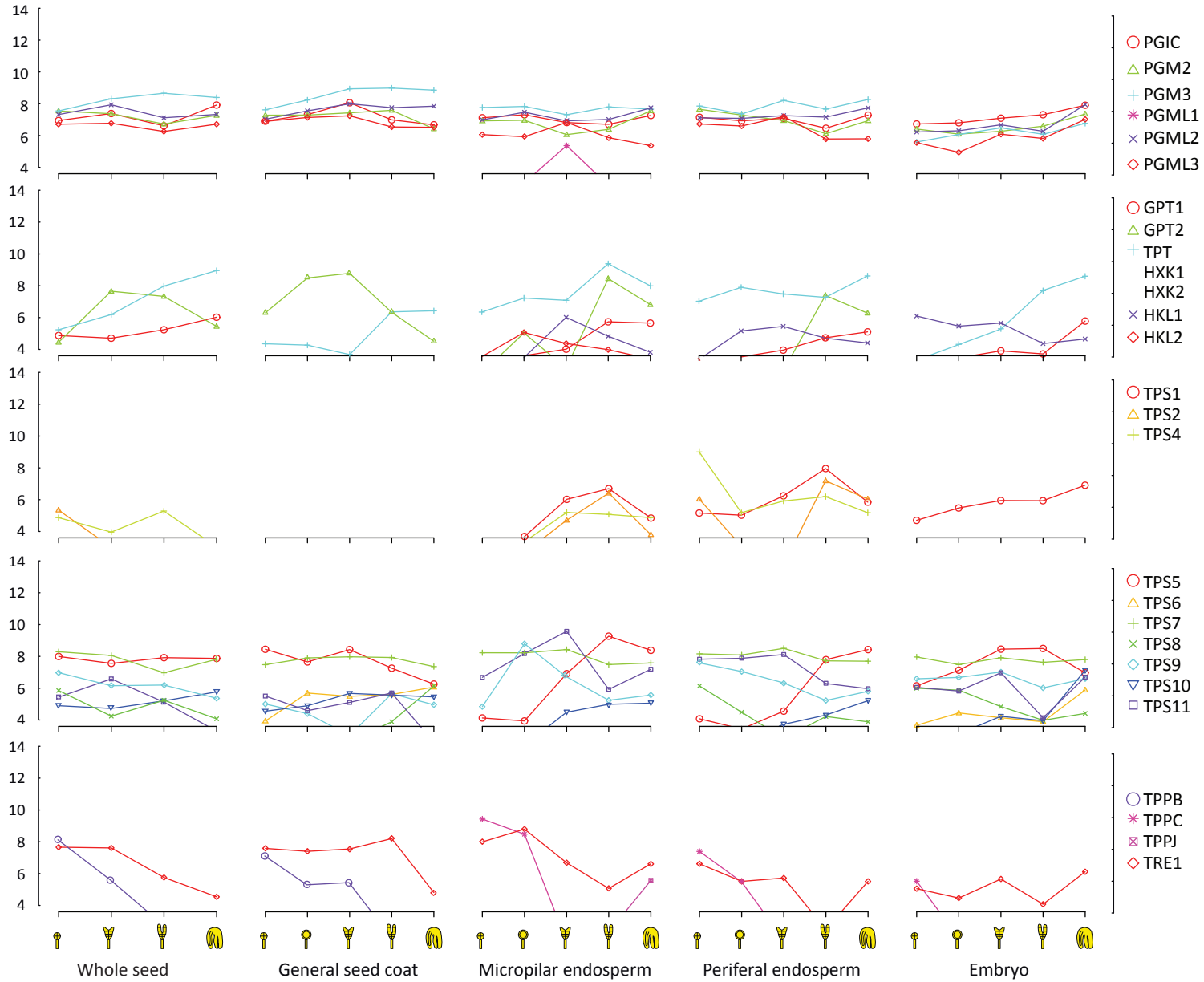

Figure S2.6 Transcript levels for hexose phosphate metabolism and translocation genes at different whole seed, general seed coat, micropilar and periferal endosperm, and embryo developmental stages

Supplemental Figure S3. Full list of sugar and sugar phosphate transport and metabolism genes expressed in the chalazal region of the seed. Expression values (log2-scale) in the chalazal endosperm (A,B), and the chalazal seed coat (C,D).

Supplemental Figure S4 Expression values (log2-scale) for sugar transport and metabolism gene during the developments of different flower and silique organs/tissues/cells (Figures S4.1-S4.6: pages 11-16)**.** Briefly, both general and specific patterns can be distinguished. General patterns: (i) While many gene members from the same family are expressed in different flower organs, single cell analysis revealed less representation per transporter family, (ii) the expression of these genes at the whole flower level appears uninformative and mainly reflected the expression level within the carpel, (iii) the expression level within the carpel is globally steady during the first 8 hours after pollination, (iv) the highest variation was registered in the two analyzed stages of stamen development. Specific patterns: some genes were either highly expressed in all organs and stages or specific to some organs or developmental stages. Representatives of the former are *SPS1*/*SPP2*, *SUC2*, *cwINV1*, and *PMT5*. Representatives of the latter are *cwINV4* and *SWEET9* within the nectaries. Within the different reproductive cells analyzed, similar activities were found for sucrose biosynthesis and transport, and for *SWEET8*. Examples of cell-specific high expressions are *STP2* and *ERDL14* within the *MMC*, *PMT6* within the central cell, and *SPS2F*, *cwINV5* (an invertase not found at significant levels within any other floral organ/tissue), *vacINV1*, and the mitochondrial neutral invertase A within the sperm cells.

Comparing the expression levels within the chalazal region (see main text, Figure 8) with those reported here for the peripheral and micropylar endosperm, for the embryo, and for the whole seed coat, a globally similar activities in the three endosperm regions are found except for invertase activities at early stages of embryo development. The highest expression levels of cell wall and cytoplasmic invertase activities occur indeed within the chalazal seed coat and the chalazal endosperm, respectively. All other tissues, including the embryo and the whole seed coat, either express a lower invertase activity or don't show any significant expression level.

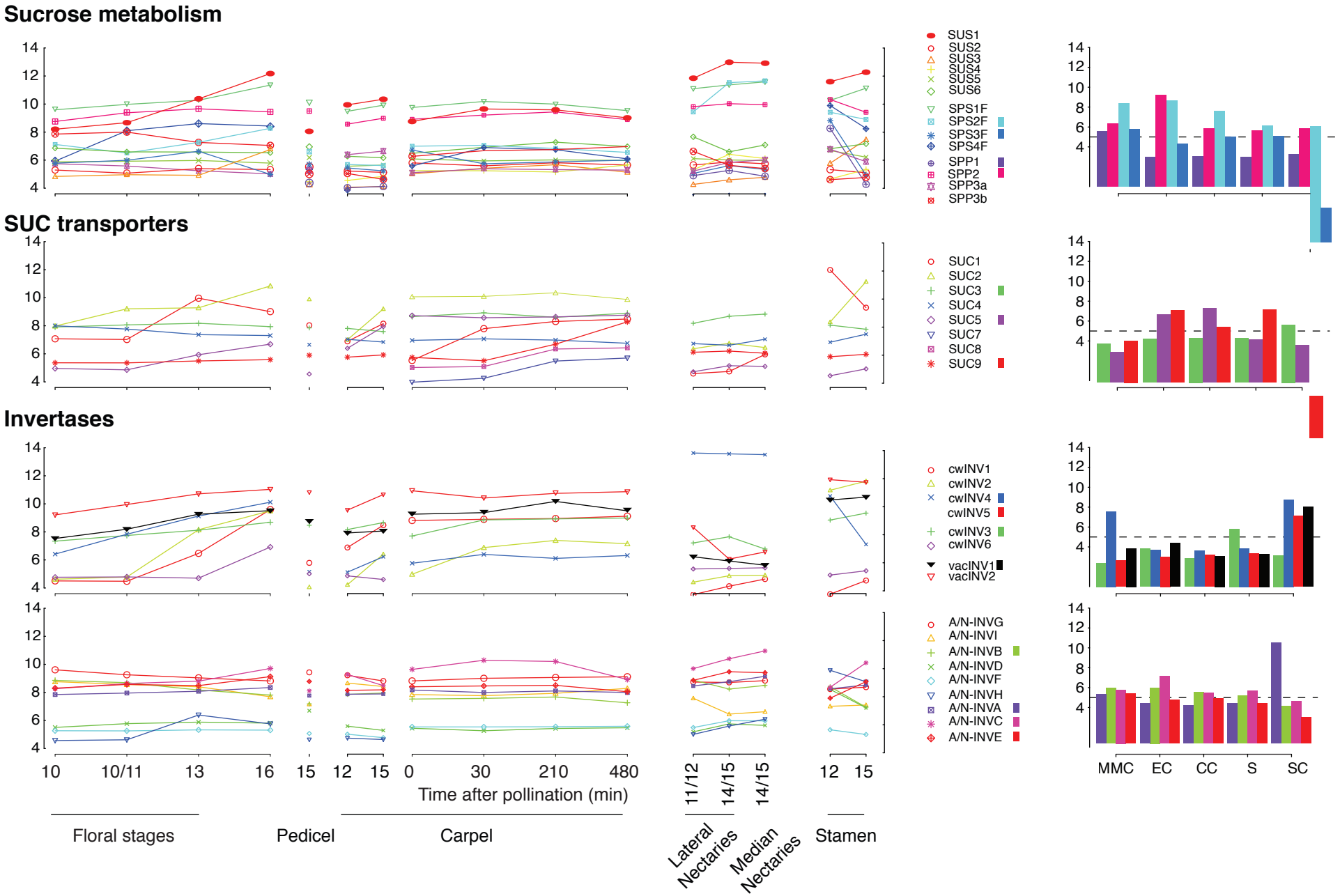

Figure S4.1 Transcript levels for sucrose transport/metabolism and invertase genes at different floral stages, within different floral organs, within the carpel at different times after pollination, and within different gametic cells (MMC: megaspore mother cell, EC: egg cell, CC: central cell, S: synergid, SC: sperm cell).

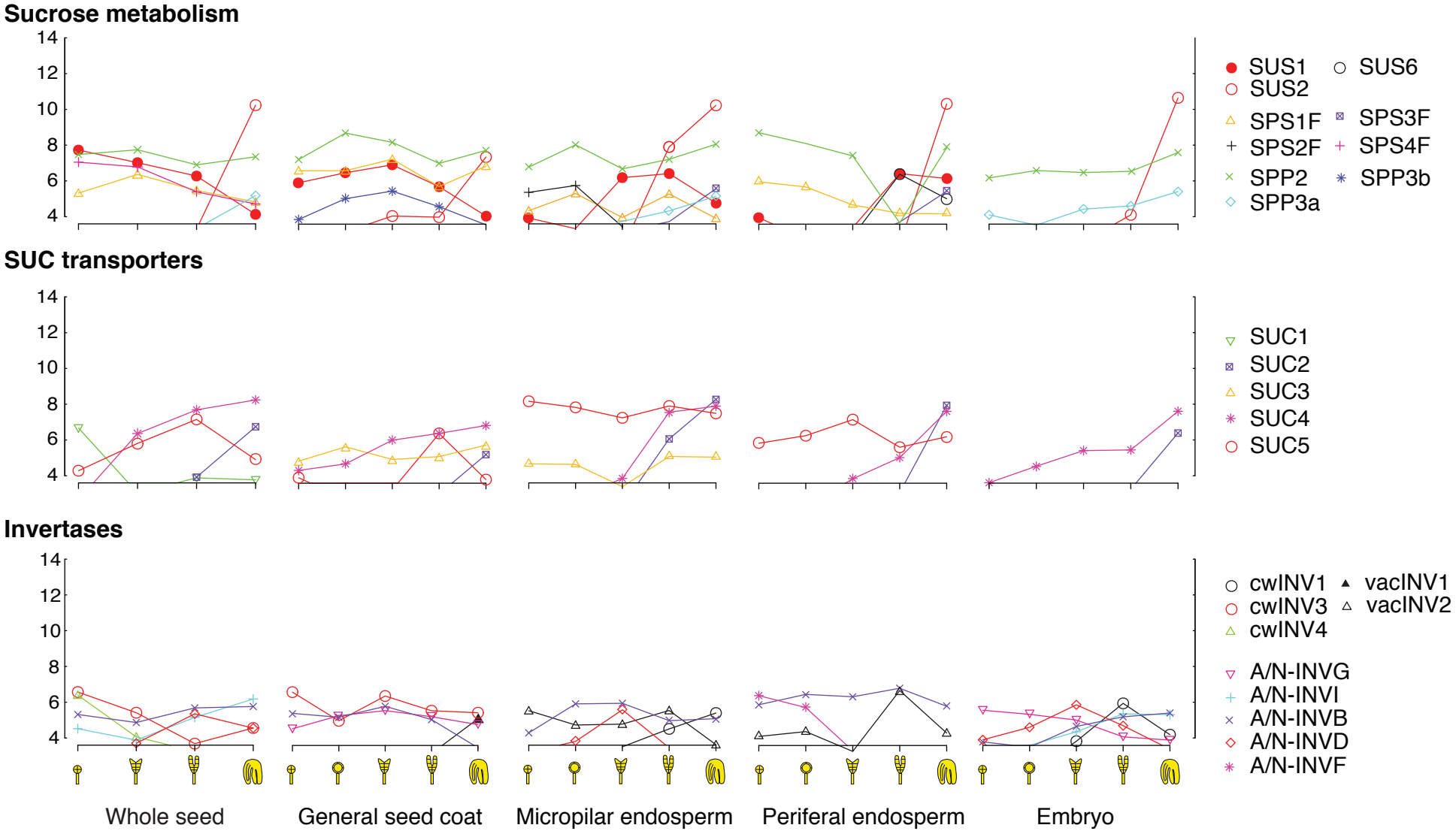

Figure S4.2 Transcript levels for sucrose transport/metabolism and invertase genes at different whole seed, general seed coat, micropilar and periferal endosperm, and embryo developmental stages

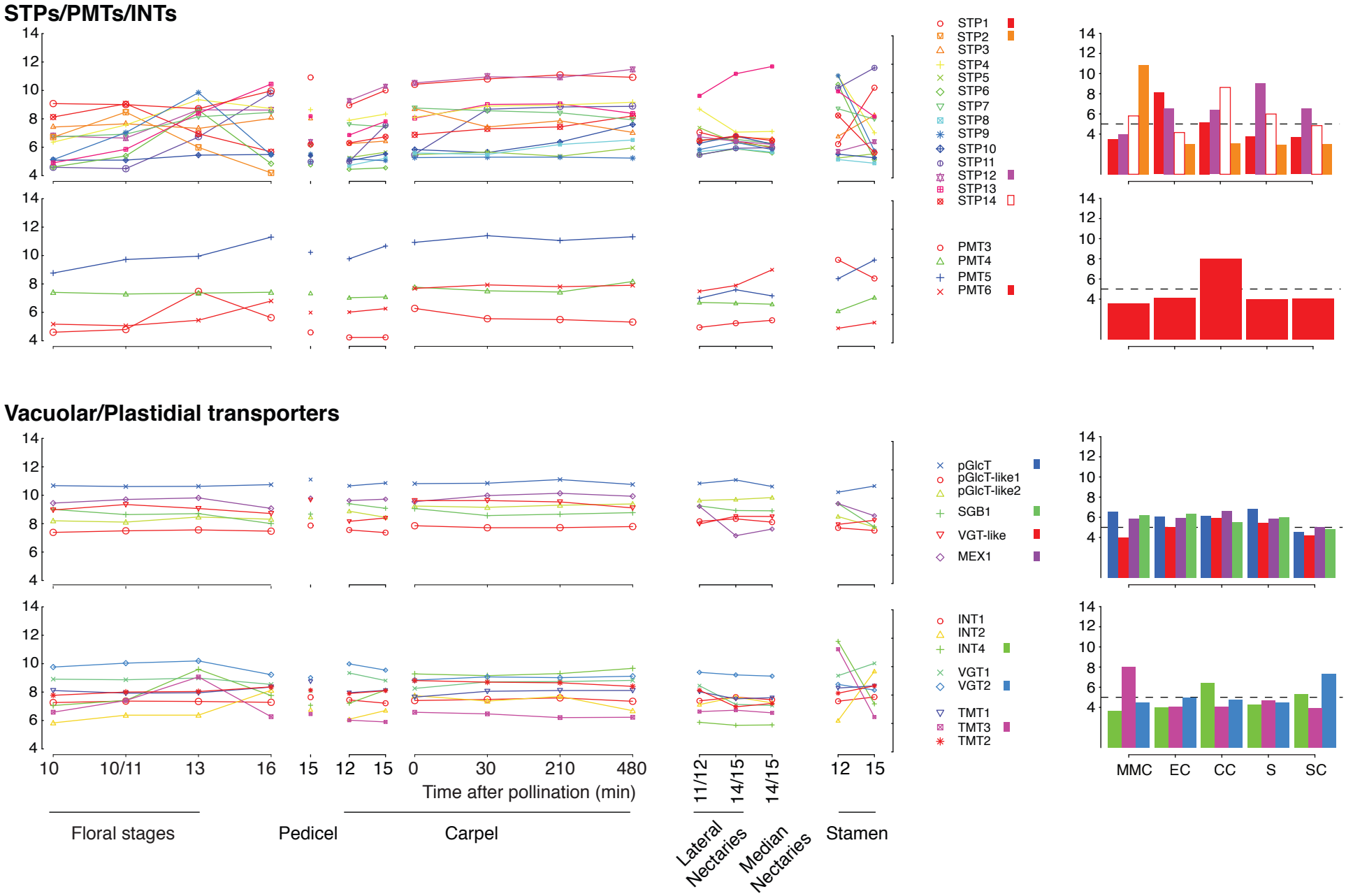

Figure S4.3 Transcript levels for different sugar transport genes at different floral stages, within different floral organs, within the carpel at different times after pollination, and within different gametic cells (MMC: megaspore mother cell, EC: egg cell, CC: central cell, S: synergid, SC: sperm cell).

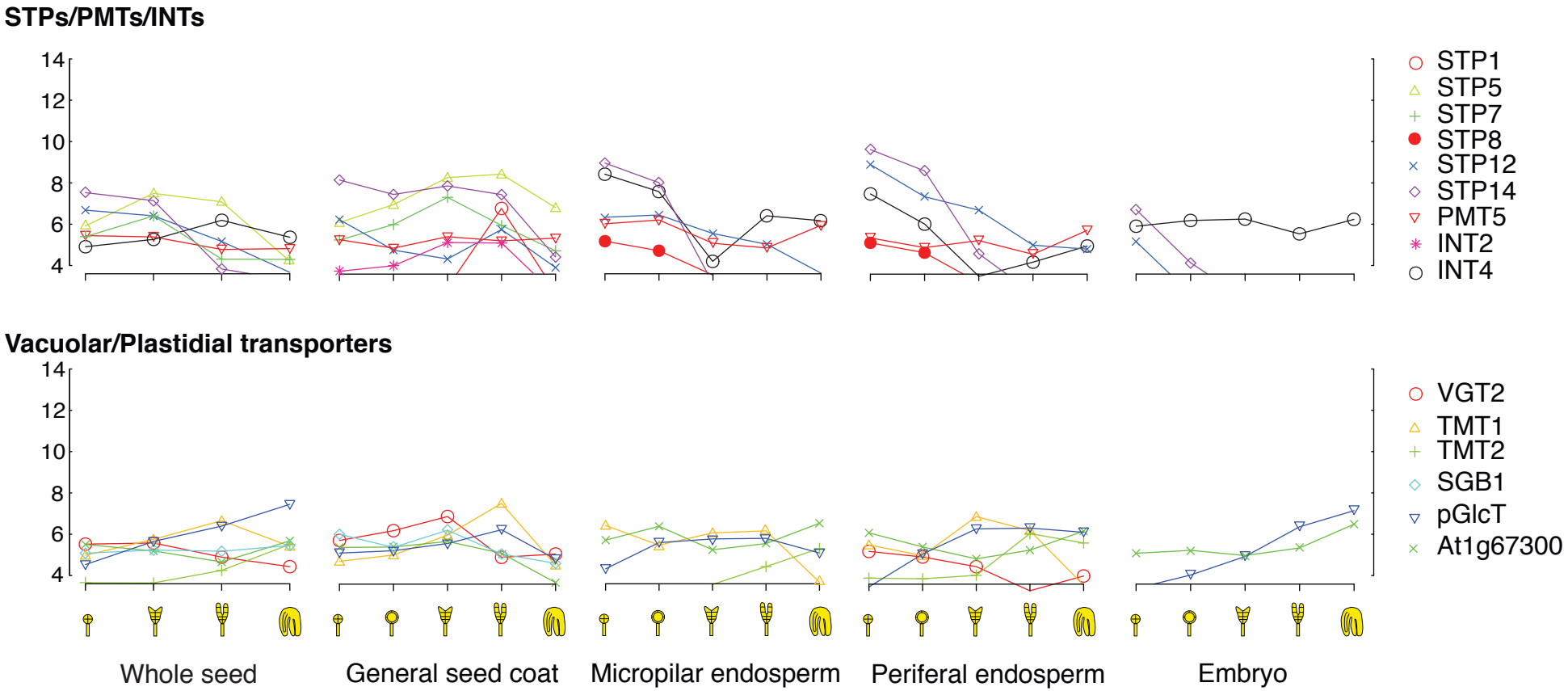

Figure S4.4 Transcript levels for different sugar transport genes at different whole seed, general seed coat, micropilar and periferal endosperm, and embryo developmental stages

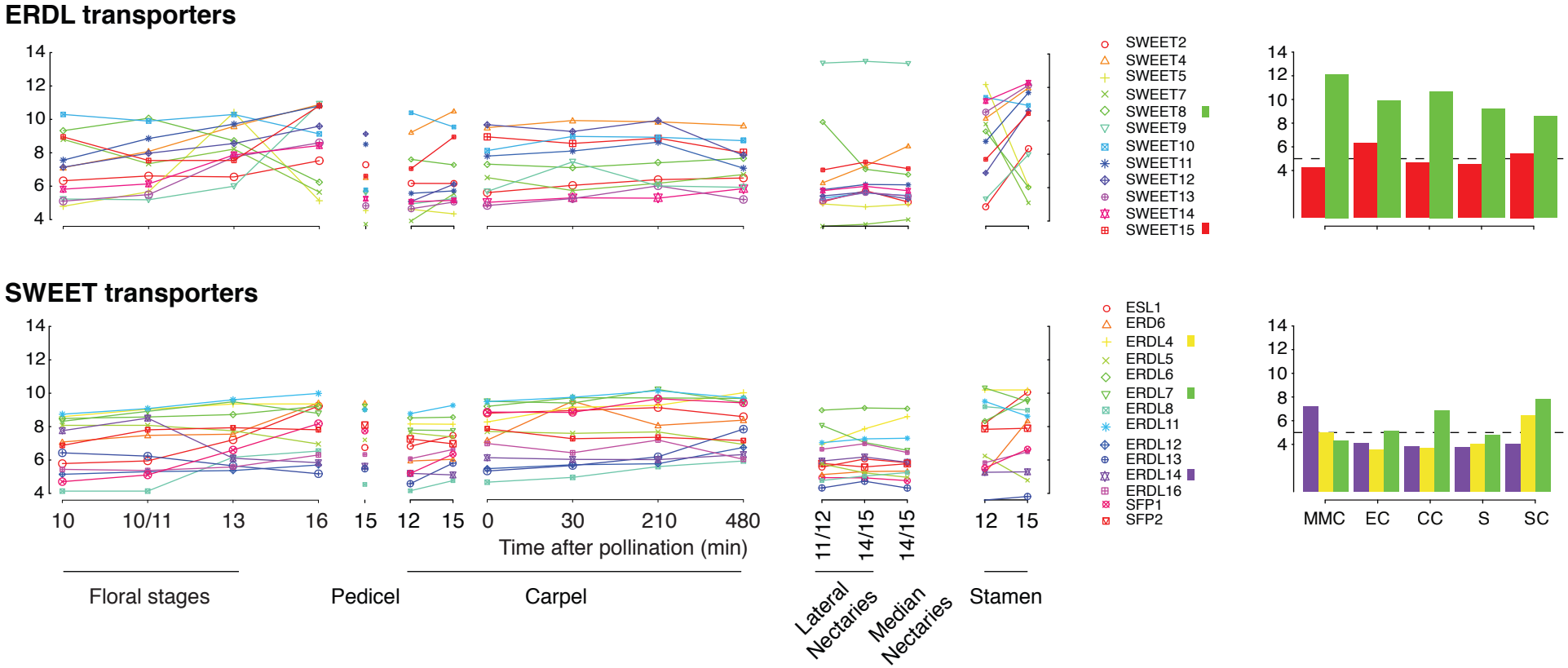

Figure S4.5 Transcript levels for ERDL and SWEET transporter genes at different floral stages, within different floral organs, within the carpel at different times after pollination, and within different gametic cells (MMC: megaspore mother cell, EC: egg cell, CC: central cell, S: synergid, SC: sperm cell).

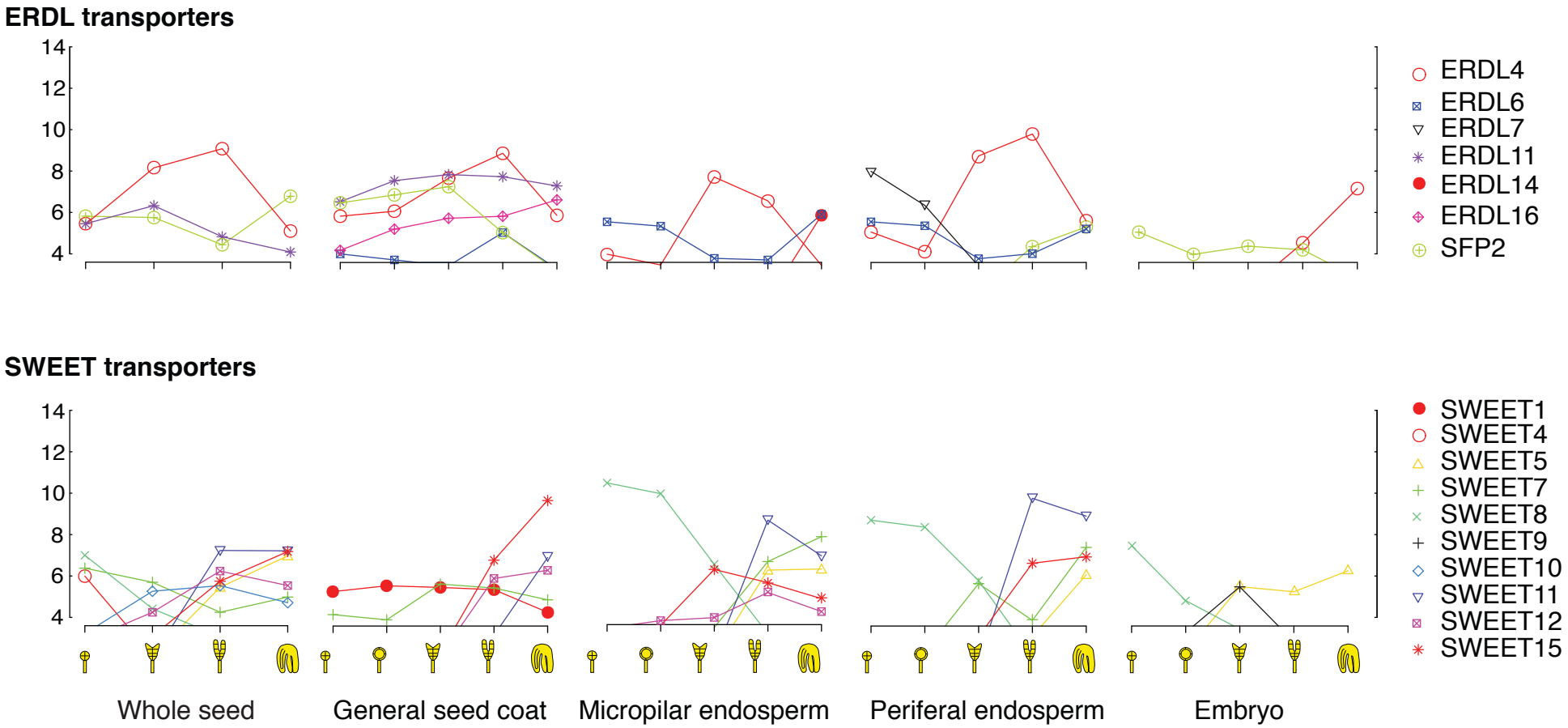

Figure S4.6 Transcript levels for ERDL and SWEET transporter genes at different whole seed, general seed coat, micropilar and periferal endosperm, and embryo developmental stages

Supplemental Table S1. List of the carbohydrate metabolism and transport genes included in this study. A, Sugar genes. B, Hexose phosphate and starch genes. C, Array sets. D, Primers used in this study. E, Literature cited

A- Sugar transport and metabolism genes

Gene name	Group	Enzyme	Locus	References
SUS1	**Sucrose synthesis/degradation**	Sucrose Synthase1	At5g20830	Fallahi et al. 2008
SUS2		Sucrose Synthase2	At5g49190	
SUS3		Sucrose Synthase3	At4g02280	
SUS4		Sucrose Synthase4	At3g43190	
SUS5		Sucrose Synthase5	At5g37180	
SUS6		Sucrose Synthase6	At1g73370	
SPS1F	**Sucrose synthesis**	Sucrose Phosphate Synthase1F	AT5G20280	Lunn 2003, Lutfiyya et al. 2007
SPS2F		Sucrose Phosphate Synthase2F	AT5G11110	
SPS3F		Sucrose Phosphate Synthase3F	AT1G04920	
SPS4F		Sucrose Phosphate Synthase4F	AT4G10120	
SPP1		Sucrose Phosphatase1	AT1G51420	
SPP3b		Sucrose Phosphatase3b	AT3G52340	
SPP2		Sucrose Phosphatase2	AT2G35840	
SPP3a		Sucrose Phosphatase3a	At3G54270	
AtSUC1	**Sucrose transporters**	sucrose-H+ symporter	At1g71880	Williams et al. 2000, https://www.arabidopsis.org/browse/genefamily/sucrose.jsp
AtSUC2		sucrose-H+ symporter	At1g22710	
AtSUC3		Sucrose-H+ symporter	At2g02860	
AtSUC4		sucrose-H+ symporter	At1g09960	
AtSUC5		sucrose-H+ symporter	At1g71890	
AtSUC6		sucrose transporter-like protein (non-functional ?)	At5g43610	
AtSUC7		sucrose transporter-like protein	At1g66570	
AtSUC8		sucrose-H+ symporter	At2g14670	
AtSUC9		sucrose-H+ symporter	At5g06170	
AtcwINV1	**Cell wall acid invertases**	Cell Wall Invertase 1	At3g13790	Sherson et al. 2003
AtcwINV2		Cell Wall Invertase 2	At3g52600	
AtcwINV3		Cell Wall Invertase 3	At1g55120	
AtcwINV4		Cell Wall Invertase 4	At2g36190	
AtcwINV5		Cell Wall Invertase 5	At3g13784	
AtcwINV6		Cell Wall Invertase 6	At5g11920	
AtvacINV1	**Vacuolar acid invertases**	Vaculoar Invertase 1 (At_betafruct3)	At1g62660	Sergeeva et al. 2006
AtvacINV2		Vaculoar Invertase 2 (At_betafruct4)	AT1G12240	
A/N-INVG	**Cytoplasmic neutral invertases**	Alkaline/neutral Invertase G (CINV1)	At1g35580	Vargas et al. 2008
A/N-INVI		Alkaline/neutral Invertase I (CINV2)	At4g09510	
A/N-INVB		Alkaline/neutral Invertase B	At4g34860	
A/N-INVD		Alkaline/neutral Invertase D	At1g22650	
A/N-INVF		Alkaline/neutral Invertase F	At1g72000	
A/N-INVH		Alkaline/neutral Invertase H	At3g05820	
A/N-INVA		Alkaline/neutral Invertase A	At1g56560	
A/N-INVC		Alkaline/neutral Invertase C	At3g06500	
A/N-INVE		Alkaline/neutral Invertase E	At5g22510	
AtSTP1	**Sugar Transport Protein**	Monosaccharide-H+ symporter	At1g11260	
AtSTP2			At1g07340	
AtSTP3			At5g61520	
AtSTP4			At3g19930	
AtSTP5			At1g34580	
AtSTP6			At3g05960	
AtSTP7			At4g02050	

AtSTP8			At5g26250	
AtSTP9			At1g50310	Buettner and Sauer 2000, https://www.arabidopsis.org/browse/genefamily/Monos.jsp
AtSTP10			At3g19940	
AtSTP11			At5g23270	
AtSTP12			At4g21480	
AtSTP13			At5g26340	
AtSTP14			At1g77210	
AtPMT1	**Polyol/monosaccharide transporters**	Polyol and monosaccharide H+ symporter PLT1	At2g16120	
AtPMT2		Polyol and monosaccharide H+ symporter PLT2	At2g16130	
AtPMT3		Polyol and monosaccharide H+ symporter PLT3	At2g18480	
AtPMT4		Polyol and monosaccharide H+ symporter PLT4	At2g20780	
AtPMT5		Polyol and monosaccharide H+ symporter PLT5	At3g18830	
AtPMT6		Polyol and monosaccharide H+ symporter PLT6	At4g36670	
AtINT1	**Inositol Transporters**	Putative polyol (cyclic) transporter	At2g43330	
AtINT2			At1g30220	
AtINT3			At2g35740	
AtINT4			At4g16480	
AtVGT1	**Vacuolar glucose transporters-like**	Tonoplast sugar transport protein	At3g03090	Buettner and Sauer 2000, Williams et al. 2000
AtVGTL1			At5g17010	
AtVGTL2			At5g59250	
AtTMT1	**Tonoplast Monosaccharide transporters**	Tonoplast monosaccharide transporter	At1g20840	Buettner and Sauer 2000, https://www.arabidopsis.org/browse/genefamily/Monos.jsp
AtTMT2			At4g35300	
AtTMT3			At3g51490	
At1g05030	**Plastidic sugar transporters**	Putative monosaccharide transporter	At1g05030	Buettner and Sauer 2000, Williams et al. 2000
At1g67300			At1g67300	
SGB1			At1g79820	
pGlcT			At5g16150	
MEX1		MALTOSE EXCESS 1	AT5G17520	
SWEET1	**SWEET sugar transporters**	Sugars Will Eventually be Exported Transporter1	AT1G21460	Chen et al. 2010
SWEET2		Sugars Will Eventually be Exported Transporter2	AT3G14770	
SWEET3		Sugars Will Eventually be Exported Transporter3	AT5G53190	
SWEET4		Sugars Will Eventually be Exported Transporter4	AT3G28007	
SWEET5 (VEX1)		Sugars Will Eventually be Exported Transporter5	AT5G62850	
SWEET6		Sugars Will Eventually be Exported Transporter6	AT1G66770	
SWEET7		Sugars Will Eventually be Exported Transporter7	AT4G10850	
SWEET8 (RPG1)		Sugars Will Eventually be Exported Transporter8	AT5G40260	
SWEET9		Sugars Will Eventually be Exported Transporter9	AT2G39060	
SWEET10		Sugars Will Eventually be Exported Transporter10	AT5G50790	
SWEET11		Sugars Will Eventually be Exported Transporter11	AT3G48740	
SWEET12		Sugars Will Eventually be Exported Transporter12	AT5G23660	
SWEET13 (RPG2)		Sugars Will Eventually be Exported Transporter13	AT5G50800	
SWEET14		Sugars Will Eventually be Exported Transporter14	AT4G25010	
SWEET15 (SAG29)		Sugars Will Eventually be Exported Transporter15	AT5G13170	
SWEET16		Sugars Will Eventually be Exported Transporter16	AT3G16690	
SWEET17		Sugars Will Eventually be Exported Transporter17	AT4G15920	
AtERDL1	**Early Responsive to Dehydration6-Like**	Putative sugar transport protein (ERD-group)	At1g08890	Buettner and Sauer 2000, https://www.arabidopsis.org/browse/genefamily/Monos.jsp
AtERDL2		Putative sugar transport protein (ERD-group)	At1g08900	
ESL1		Putative sugar transport protein (ERD-group)	At1g08920	
AtERD6		Putative sugar transport protein, ERD6	At1g08930	
AtERDL4		Putative sugar transport protein (ERD-group)	At1g19450	
AtERDL5		Putative sugar transport protein (ERD-group)	At1g54730	
AtERDL6		Proton-driven vacuolar glucose experter	At1g75220	
AtERDL7		Putative sugar transport protein (ERD-group)	At2g48020	
AtERDL8		Putative sugar transport protein (ERD-group)	At3g05150	
AtERDL9		Putative sugar transport protein (ERD-group)	At3g05160	
AtERDL10		Putative sugar transport protein (ERD-group)	At3g05165	
AtERDL11		Putative sugar transport protein (ERD-group)	At3g05400	
AtERDL12		Putative sugar transport protein (ERD-group)	At3g20460	
AtERDL13		Putative sugar transport protein (ERD-group)	At4g04750	
AtERDL14		Putative sugar transport protein (ERD-group)	At4g04760	
AtERDL15		Putative sugar transport protein (ERD-group)	At3g05155	
AtERDL16		Putative sugar transport protein (ERD-group)	At5g18840	
AtSFP1		Putative sugar transport protein (ERD-group)	At5g27350	
AtSFP2		Putative sugar transport protein (ERD-group)	At5g27360	

B- Starch and hexose phosphate metabolism genes

Gene name	Group	Enzyme	Locus	References
PGI1 (PGI)	**Starch biosynthesis**	Phosphoglucoisomerase	At4g24620	Streb and Zeeman 2012
PGM1 (PGM)		Phosphoglucomutase	At5g51820	
APS1 (ADG1)		AGPase small subunit 1	At5g48300	
APS2		AGPase small subunit-like 2	At1g05610	
APL1 (ADG2)		AGPase large subunit 1	At5g19220	
APL2		AGPase large subunit 2	At1g27680	
APL3		AGPase large subunit 3	At4g39210	
APL4		AGPase large subunit 4	At2g21590	
GBS1		Granule-bound starch synthase 1	At1g32900	
SS1		Soluble starch synthase 1	At5g24300	
SS2		Soluble starch synthase 2	At3g01180	
SS3		Soluble starch synthase 3	At1g11720	
SS4		Soluble starch synthase 4	At4g18240	
BE1		Starch branching enzyme 1	At3g20440	
BE2		Starch branching enzyme 2	At5g03650	
BE3		Starch branching enzyme 3	At2g36390	
ISA1		Isoamylase 1	At2g39930	
ISA2		Isoamylase 2	At1g03310	
GWD1 (SEX1)	**Starch Breakdown**	Glucan, water dikinase 1	At1g10760	
GWD2		Glucan, water dikinase 2	At4g24450	
PWD (GWD3)		Phosphoglucan, water dikinase	At5g26570	
SEX4		Starch excess 4	At3g52180	
LSF2		Like Sex Four 2	At3g10940	
LSF1		Like Sex Four 1	At3g01510	
BAM1 (BMY7 /TR-BYM)		beta-Amylase 1	At3g23920	
BAM2 (BMY9)		beta-Amylase 2	At4g00490	
BAM3 (BMY8)		beta-Amylase 3	At4g17090	
BAM4		beta-Amylase 4	At5g55700	
BAM5 (BMY1 / RAM1)		beta-Amylase 5	At4g15210	
BAM6		beta-Amylase 6	At2g32290	
BAM7		beta-Amylase 7	At2g45880	
BAM8		beta-Amylase 8	At5g45300	
BAM9 (BMY3)		beta-Amylase 9	At5g18670	
AMY1		alpha-Amylase 1	At4g25000	
AMY2		alpha-Amylase 2	At1g76130	
AMY3		alpha-Amylase 3	At1g69830	
ISA3		Isoamylase 3	At4g09020	
LDA (PU1)		Limit dextrinase	At5g04360	
PHS1		Glucan phosphorylase	At3g29320	
PHS2		Glucan phosphorylase	At3g46970	
DPE1		Disproportionating enzyme	At5g64860	
DPE2		Maltose transglucosidase	At2g40840	
PGIC		Phosphoglucoisomerase	At5g42740	Arabidopsis.org
PGM2		Phosphoglucomutase2	At170730	Egli et al 2010
PGM3		Phosphoglucomutase3	At1g23190	
PGML1		Phosphoglucomutase-like1	At1g70820	
PGML2		Phosphoglucomutase-like2	At4g11570	
PGML3		Phosphoglucomutase-like3	At5g17530	
HXK1		Hexokinase1	At4g29130	Karve et al 2008, Moore et al. 2003
HXK2		Hexokinase2	At2g19860	
HXK3		Hexokinase3	At1g47840	
HKL1		Hexokinase-like1	At1g50460	
HKL2		Hexokinase-like2	At3g20040	
HKL3		Hexokinase-like3	At4g37840	
AtUGP1		UDP-glucose pyrophosphorylase1	At3g03250	Park et al 2010
AtUGP2		UDP-glucose pyrophosphorylase2	At5g17310	

AtTPS1	**Cytoplasmic hexose-phosphate metabolism**	T6P Synthase	At1g78580	Vandesteene et al 2010
AtTPS2			At1g16980	
AtTPS3			At1g17000	
AtTPS4			At4g27550	
AtTPS5		T6P Synthase	At4g17770	
AtTPS6			At1g68020	
AtTPS7			At1g06410	
AtTPS8			At1g70290	
AtTPS9			At1g23870	
AtTPS10			At1g60140	
AtTPS11			At2g18700	
AtTPPA		T6P Phosphatase	At5g51460	
AtTPPB			At1g78090	
AtTPPC			At1g22210	
AtTPPD			At1g35910	
AtTPPE			At2g22190	
AtTPPF			At4g12430	
AtTPPG			At4g22590	
AtTPPH			At4g39770	
AtTPPI			At5g10100	
AtTPPJ			At5g65140	
AtTRE1		Trehalase	At4g24040	
AtGPT1	**Plastidic translocators and translocator-likes**	6-phosphate/phosphate translocator1	At5g54800	Niewiadomski et al 2005
AtGPT2		6-phosphate/phosphate translocator2	At1g61800	
AtGPT2-like		glucose 6 phosphate/phosphate translocator-like protein	At5g17630	Ward 2001
TPT (TPT1)		phosphate/triose-phosphate translocator precursor	At5g46110	
Transloc_Fam		Hypothetical protein	At4g04300	
Transloc_Fam1		Putative protein	At5g28230	
PPT1		phosphate/phosphoenolpyruvate translocator precursor	At5g33320	
PPT2		putative phosphate/phosphoenolpyruvate translocator	At3g01550	

C- Arrays used in this work

Array set	Sample	Description	Accession number	Reference
Flower stages	ATGE_31_A2	flowers at floral stage 9	ATMX-9	Schmid et al., 2005
	ATGE_31_B2	flowers at floral stage 9	ATMX-9	Schmid et al., 2005
	ATGE_31_C2	flowers at floral stage 9	ATMX-9	Schmid et al., 2005
	ATGE_32_A2	flowers at floral stage 10 to 11	ATMX-9	Schmid et al., 2005
	ATGE_32_B2	flowers at floral stage 10 to 11	ATMX-9	Schmid et al., 2005
	ATGE_32_C2	flowers at floral stage 10 to 11	ATMX-9	Schmid et al., 2005
	ATGE_33_A	flowers at floral stage 13	ATMX-9	Schmid et al., 2005
	ATGE_33_B	flowers at floral stage 13	ATMX-9	Schmid et al., 2005
	ATGE_33_C	flowers at floral stage 13	ATMX-9	Schmid et al., 2005
	ATGE_39_A	flowers at floral stage 16	ATMX-9	Schmid et al., 2005
	ATGE_39_B	flowers at floral stage 16	ATMX-9	Schmid et al., 2005
	ATGE_39_C	flowers at floral stage 16	ATMX-9	Schmid et al., 2005
	GSM674593	pistil before pollination	GSE27281	Boavida et al., 2011
	GSM674594	pistil before pollination	GSE27281	Boavida et al., 2011
	GSM674587	pistil 30 min after pollination	GSE27281	Boavida et al., 2011
	GSM674588	pistil 30 min after pollination	GSE27281	Boavida et al., 2011
	GSM674589	pistil 210 min after pollination	GSE27281	Boavida et al., 2011
	GSM674590	pistil 210 min after pollination	GSE27281	Boavida et al., 2011
	GSM674591	pistil 480 min after pollination	GSE27281	Boavida et al., 2011
	GSM674592	pistil 480 min after pollination	GSE27281	Boavida et al., 2011
	ATGE_76_A	siliques at seed stage 3	ATMX-9	Schmid et al., 2005
	ATGE_76_B	siliques at seed stage 3	ATMX-9	Schmid et al., 2005
	ATGE_76_C	siliques at seed stage 3	ATMX-9	Schmid et al., 2005
	ATGE_77_D	siliques at seed stage 4	ATMX-9	Schmid et al., 2005
	ATGE_77_E	siliques at seed stage 4	ATMX-9	Schmid et al., 2005
	ATGE_77_F	siliques at seed stage 4	ATMX-9	Schmid et al., 2005
	ATGE_78_D	siliques at seed stage 5	ATMX-9	Schmid et al., 2005
	ATGE_78_E	siliques at seed stage 5	ATMX-9	Schmid et al., 2005
	ATGE_78_F	siliques at seed stage 5	ATMX-9	Schmid et al., 2005
	ATGE_79_A	seeds at stage 6	ATMX-9	Schmid et al., 2005
	ATGE_79_B	seeds at stage 6	ATMX-9	Schmid et al., 2005
	ATGE_79_C	seeds at stage 6	ATMX-9	Schmid et al., 2005
	ATGE_81_A	seeds at stage 7	ATMX-9	Schmid et al., 2005
	ATGE_81_B	seeds at stage 7	ATMX-9	Schmid et al., 2005
	ATGE_81_C	seeds at stage 7	ATMX-9	Schmid et al., 2005
	ATGE_82_A	seeds at stage 8	ATMX-9	Schmid et al., 2005
	ATGE_82_B	seeds at stage 8	ATMX-9	Schmid et al., 2005
	ATGE_82_C	seeds at stage 8	ATMX-9	Schmid et al., 2005

	ATGE_83_A	seeds at stage 9	ATMX-9	Schmid et al., 2005
	ATGE_83_B	seeds at stage 9	ATMX-9	Schmid et al., 2005
	ATGE_83_C	seeds at stage 9	ATMX-9	Schmid et al., 2005
	ATGE_84_A	seeds at stage 10	ATMX-9	Schmid et al., 2005
	ATGE_84_B	seeds at stage 10	ATMX-9	Schmid et al., 2005
	ATGE_84_D	seeds at stage 10	ATMX-9	Schmid et al., 2005
Floral organs	ATGE_36_A	stamens at floral stage 12	ATMX-9	Schmid et al., 2005
	ATGE_36_B	stamens at floral stage 12	ATMX-9	Schmid et al., 2005
	ATGE_36_C	stamens at floral stage 12	ATMX-9	Schmid et al., 2005
	ATGE_43_A	stamens at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_43_B	stamens at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_43_C	stamens at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_37_A	carpels at floral stage 12	ATMX-9	Schmid et al., 2005
	ATGE_37_B	carpels at floral stage 12	ATMX-9	Schmid et al., 2005
	ATGE_37_C	carpels at floral stage 12	ATMX-9	Schmid et al., 2005
	ATGE_45_A	carpels at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_45_B	carpels at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_45_C	carpels at floral stage 15	ATMX-9	Schmid et al., 2005
	GSM390164	lateral nectary at floral stage 11 to 12	GSE15601	Kram et al., 2009
	GSM390165	lateral nectary at floral stage 11 to 12	GSE15601	Kram et al., 2009
	GSM390166	lateral nectary at floral stage 11 to 12	GSE15601	Kram et al., 2009
	GSM390161	lateral nectary at floral stage 14 to 15	GSE15601	Kram et al., 2009
	GSM390162	lateral nectary at floral stage 14 to 15	GSE15601	Kram et al., 2009
	GSM390163	lateral nectary at floral stage 14 to 15	GSE15601	Kram et al., 2009
	GSM390167	median nectary at floral stage 14 to 15	GSE15601	Kram et al., 2009
	GSM390168	median nectary at floral stage 14 to 15	GSE15601	Kram et al., 2009
	ATGE_40_A	pedicels at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_40_B	pedicels at floral stage 15	ATMX-9	Schmid et al., 2005
	ATGE_40_C	pedicels at floral stage 15	ATMX-9	Schmid et al., 2005
Pollen stages	GSM142734	pollen unicellular	GSE6162	Honys et al., 2004
	GSM142737	pollen unicellular	GSE6162	Honys et al., 2004
	GSM142735	pollen bicellular	GSE6162	Honys et al., 2004
	GSM142738	pollen bicellular	GSE6162	Honys et al., 2004
	GSM142736	pollen tricellular	GSE6162	Honys et al., 2004
	GSM142739	pollen tricellular	GSE6162	Honys et al., 2004
	GSM142740	pollen mature	GSE6162	Honys et al., 2004
	At_pollenGrain_J8_ATH1_IGC1_J	pollen mature	E-MEXP-285	Pina et al., 2005
	At_pollenGrain_J9_new_ATH1_IG	pollen mature	E-MEXP-285	Pina et al., 2005
	At_Pollen_Rep1_ATH1_IGC_FB	pollen mature	E-ATMX-35	Borges et al. 2008
	At_Pollen_Rep2_ATH1_IGC_FB	pollen mature	E-ATMX-35	Borges et al. 2008
	At_Pollen_Rep3_ATH1_IGC_FB	pollen mature	E-ATMX-35	Borges et al. 2008
	ATGE_73_A	pollen mature	ATMX-9	Schmid et al. 2005
	ATGE_73_B	pollen mature	ATMX-9	Schmid et al. 2005
	ATGE_73_C	pollen mature	ATMX-9	Schmid et al. 2005
	GSM154503	pollen mature	GSE6696	Wang et al., 2008
	GSM154504	pollen mature	GSE6696	Wang et al., 2008
	GSM433634	pollen mature	GSE17343	Qin et al., 2009
	GSM433635	pollen mature	GSE17343	Qin et al., 2009
	GSM433636	pollen mature	GSE17343	Qin et al., 2009
	GSM433637	pollen mature	GSE17343	Qin et al., 2009
	GSM154505	pollen hydrated	GSE6696	Wang et al., 2008
	GSM154506	pollen hydrated	GSE6696	Wang et al., 2008
	GSM433638	pollen tube growing for 30 min	GSE17343	Qin et al., 2009
	GSM433639	pollen tube growing for 30 min	GSE17343	Qin et al., 2009
	GSM433640	pollen tube growing for 30 min	GSE17343	Qin et al., 2009
	GSM433641	pollen tube growing for 30 min	GSE17343	Qin et al., 2009
	GSM433642	pollen tube growing for 240 min	GSE17343	Qin et al., 2009
	GSM433643	pollen tube growing for 240 min	GSE17343	Qin et al., 2009
	GSM433644	pollen tube growing for 240 min	GSE17343	Qin et al., 2009
	GSM433645	pollen tube growing for 240 min	GSE17343	Qin et al., 2009
Germline cells	Egg1	egg cell	E-MEXP-2227	Wuest et al., 2010
	Egg4	egg cell	E-MEXP-2227	Wuest et al., 2010
	Egg5	egg cell	E-MEXP-2227	Wuest et al., 2010
	Cen1	central cell	E-MEXP-2227	Wuest et al., 2010
	Cen2	central cell	E-MEXP-2227	Wuest et al., 2010
	Cen3	central cell	E-MEXP-2227	Wuest et al., 2010
	Syn1	synergids	E-MEXP-2227	Wuest et al., 2010
	Syn2	synergids	E-MEXP-2227	Wuest et al., 2010
	Syn3	synergids	E-MEXP-2227	Wuest et al., 2010
	MMC1	megaspore mother cell	E-MEXP-3137	Schmidt et al., 2011
	MMC2	megaspore mother cell	E-MEXP-3137	Schmidt et al., 2011
	MMC3	megaspore mother cell	E-MEXP-3137	Schmidt et al., 2011
	MMC4	megaspore mother cell	E-MEXP-3137	Schmidt et al., 2011
	At_Sperm_Rep1_ATH1_IGC_FB	sperms	E-ATMX-35	Borges et al., 2008
	At_Sperm_Rep2_ATH1_IGC_FB	sperms	E-ATMX-35	Borges et al., 2008
	At_Sperm_Rep3_ATH1_IGC_FB	sperms	E-ATMX-35	Borges et al., 2008
Seed stages	EarlyHE1ATH1	ovule with developing gametophyte	unknown	Yu et al., 2005
	EarlyHE2ATH1	ovule with developing gametophyte	unknown	Yu et al., 2005
	EarlyHE3ATH1	ovule with developing gametophyte	unknown	Yu et al., 2005
	GSM674595	ovule with mature gametophyte	GSE27281	Boavida et al., 2011
	GSM674596	ovule with mature gametophyte	GSE27281	Boavida et al., 2011
	GSM284386	suspensor at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284387	suspensor at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311273	embryo at pre-globular stage	GSE12404	Belmonte et al., 2013
	GSM311274	embryo at pre-globular stage	GSE12404	Belmonte et al., 2013
	GSM284384	embryo at globular stage	GSE12404	Belmonte et al., 2013
	GSM284385	embryo at globular stage	GSE12404	Belmonte et al., 2013
	GSM378645	embryo at heart stage	GSE12404	Belmonte et al., 2013
	GSM378646	embryo at heart stage	GSE12404	Belmonte et al., 2013
	GSM311287	embryo at linear cotyledon stage	GSE12404	Belmonte et al., 2013
	GSM311288	embryo at linear cotyledon stage	GSE12404	Belmonte et al., 2013

	GSM378733	embryo at bending cotyledon stage	GSE12404	Belmonte et al., 2013
	GSM378734	embryo at bending cotyledon stage	GSE12404	Belmonte et al., 2013
	GSM311275	micropylar endosperm at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311276	micropylar endosperm at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284388	micropylar endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284389	micropylar endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM378647	micropylar endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378648	micropylar endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM499420	micropylar endosperm at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM499421	micropylar endosperm at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378735	micropylar endosperm at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378736	micropylar endosperm at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311277	peripheral endosperm at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311278	peripheral endosperm at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284390	peripheral endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284391	peripheral endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM378649	peripheral endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378650	peripheral endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM311289	cellularized endosperm at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311290	cellularized endosperm at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378737	peripheral endosperm at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378738	peripheral endosperm at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311279	chalazal endosperm at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311280	chalazal endosperm at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284392	chalazal endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284393	chalazal endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284394	chalazal endosperm at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM378651	chalazal endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378652	chalazal endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378653	chalazal endosperm at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM311291	chalazal endosperm at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311292	chalazal endosperm at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378739	chalazal endosperm at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378740	chalazal endosperm at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311281	chalazal seed coat at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311282	chalazal seed coat at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284395	chalazal seed coat at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284396	chalazal seed coat at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM378654	chalazal seed coat at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378655	chalazal seed coat at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378656	chalazal seed coat at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM311293	chalazal seed coat at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311294	chalazal seed coat at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378741	chalazal seed coat at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378742	chalazal seed coat at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311283	seed coat at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311284	seed coat at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284397	seed coat at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM284398	seed coat at globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM378657	seed coat at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378658	seed coat at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM311295	seed coat at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311296	seed coat at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378743	seed coat at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378744	seed coat at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM311285	seeds at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM311286	seeds at pre-globular embryo stage	GSE12404	Belmonte et al., 2013
	GSM378659	seeds at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM378660	seeds at heart embryo stage	GSE12404	Belmonte et al., 2013
	GSM499418	seeds at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM499419	seeds at linear cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378745	seeds at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013
	GSM378746	seeds at bent cotyledon embryo stage	GSE12404	Belmonte et al., 2013

D- Primers used in this study

Primer name	Gene	Primer seuqence	Used for
GPT1-F	At5g54800	5'-TTGACATACTCACCGTTGCAG-3'	genotyping
GPT1-R		5'-TCTCTCCCAGTATATACGCGC-3'	genotyping
GPT1-F	At5g54800	5'-GGCTGTTGGGATCGTTGAGA-3'	RT-PCR, ddPCR
GPT1-R		5'-GCCACAGCAACCGGAAAAAG-3'	RT-PCR, ddPCR
pgi1-F	At4g24620	5'-TCGAGAACACACTTGATTCTAT-3'	genotyping
pgi1-R		5'-GCCAGCTCTGGCCCAA-3'	genotyping
pgm1-F	At5g51820	5'-AGGCTTCCGAGCAACTCAATATC-3'	genotyping
pgm1-R		5'-CTGACCACTGCTGTAATTGAAC-3'	genotyping
IPP2-F	At3g02780	5'-GTATGAGTTGCTTCTCCAGCAAAG-3'	RT-PCR, ddPCR
IPP2-R		5'-GAGGATGGCTGCAACAAGTGT-3'	RT-PCR, ddPCR
Act2-F	At3g18780	5'-CTT GCA CCA AGC AGC ATG AA-3'	RT-PCR, ddPCR
Act2-R		5'-CCG ATC CAG ACA CTG TAC TTC CTT-3'	RT-PCR, ddPCR
UBC9-F	At4g27960	5'-TCA CAA TTT CCA AGG TGC TGC-3'	RT-PCR, ddPCR
UBC9-R		5'-TCA TCT GGG TTT GGA TCC GT-3'	RT-PCR, ddPCR
UBC21-F	At5g25760	5'-ATG CTT GGA GTC CTG CTT GG-3'	RT-PCR
UBC21-R		5'-TGC CAT TGA ATT GAA CCC TCT C-3'	RT-PCR
PP2A-F	At1g13320	5'-TAA CGT GGC CAA AAT GAT GC-3'	RT-PCR, ddPCR
PP2A-R		5'-GTT CTC CAC AAC CGC TTG GT-3'	RT-PCR, ddPCR

E- Literature cited

Belmonte MF, Kirkbride RC, Stone SL, Pelletier JM, Bui AQ, Yeung EC, Hashimoto M, Fei J, Harada CM, Munoz MD, et al (2013) Comprehensive developmental profiles of gene activity in regions and subregions of the Arabidopsis seed. Proc Natl Acad Sci USA 110: E435–E444

Boavida LC, Borges F, Becker JD, Feijó JA (2011) Whole genome analysis of gene expression reveals coordinated activation of signaling and metabolic pathways during pollen-pistil interactions in Arabidopsis. Plant Physiol 155: 2066–2080

Borges F, Gomes G, Gardner R, Moreno N, McCormick S, Feijó JA, Becker JD (2008) Comparative transcriptomics of Arabidopsis sperm cells. Plant Physiol 148: 1168-1181

Büttner M, Sauer N (2000) Monosaccharide transporters in plants: structure, function and physiology. Biochim Biophys Acta 1465: 263–274

Chen L-Q, Hou B-H, Lalonde S, Takanaga H, Hartung ML, Qu X-Q, Guo W-J, Kim J-G, Underwood W, Chaudhuri B, et al (2010) Sugar transporters for intercellular exchange and nutrition of pathogens. Nature 468: 527–532

Egli B, Kolling K, Kohler C, Zeeman SC, Streb S (2010) Loss of cytosolic phosphoglucomutase compromises gametophyte development in Arabidopsis. Plant Physiol 154: 1659–1671

Fallahi H, Scofield GN, Badger MR, Chow WS, Furbank RT, Ruan Y-L (2008) Localization of sucrose synthase in developing seed and siliques of Arabidopsis thaliana reveals diverse roles for SUS during development. J Exp Bot 59: 3283–3295

Honys D, Twell D (2004) Transcriptome analysis of haploid male gametophyte development in Arabidopsis. Genome Biol 5: R85

Karve A, Rauh BL, Xia X, Kandasamy M, Meagher RB, Sheen J, Moore BD (2008) Expression and evolutionary features of the hexokinase gene family in Arabidopsis. Planta 228: 411–425

Kram BW, Xu WW, Carter CJ (2009) Uncovering the Arabidopsis thaliana nectary transcriptome: investigation of differential gene expression in floral nectariferous tissues. BMC Plant Biol 9: 92

Lunn JE, MacRae E (2003) New complexities in the synthesis of sucrose. Curr Opin Plant Biol 6: 208–214

Lutfiyya LL, Xu N, D'Ordine RL, Morrell JA, Miller PW, Duff SMG (2007) Phylogenetic and expression analysis of sucrose phosphate synthase isozymes in plants. J Plant Physiol 164: 923–933

Moore B, Zhou L, Rolland F, Hall Q, Cheng W-H, Liu Y-X, Hwang I, Jones T, Sheen J (2003) Role of the Arabidopsis glucose sensor HXK1 in nutrient, light, and hormonal signaling. Science 300: 332–336

Niewiadomski P (2005) The Arabidopsis plastidic glucose 6-phosphate/phosphate translocator GPT1 is essential for pollen maturation and embryo sac development. Plant Cell 17: 760–775

Park JI, Ishimizu T, Suwabe K, Sudo K, Masuko H, Hakozaki H, Nou IS, Suzuki G, Watanabe M (2010) UDP-glucose pyrophosphorylase is rate limiting in vegetative and reproductive phases in Arabidopsis thaliana. Plant Cell Physiol 51: 981–996

Pina P, Pinto F, Feijó JA, Becker JD (2005) Gene family analysis of the Arabidopsis pollen transcriptome reveals biological implications for cell growth, division control, and gene expression regulation. Plant Physiol 138: 744-756

Qin Y, Leydon AR, Manziello A, Pandey R, Mount D, Denic S, Vasic B, Johnson MA, Palanivelu R (2009) Penetration of the stigma and style elicits a novel transcriptome in pollen tubes, pointing to genes critical for growth in a pistil. PLoS Genet 5: e1000621

Schmid M, Davison TS, Henz SR, Pape UJ, Demar M, Vingron M, Schölkopf B, Weigel D, Lohmann J (2005) A gene expression map of Arabidopsis development. Nature Genet 37: 501-506

Schmidt A, Wüest SE, Vijverberg K, Baroux C, Kleen D, Grossniklaus U (2011) Transcriptome analysis of the Arabidopsis megaspore mother cell uncovers the importance of RNA helicases for plant germline development. PLoS Biol 9: e1001155

Sergeeva LI, Keurentjes JJB, Bentsink L, Vonk J, Van Der Plas LHW, Koornneef M, Vreugdenhil D (2006) Vacuolar invertase regulates elongation of Arabidopsis thaliana roots as revealed by QTL and mutant analysis. Proc Natl Acad Sci USA 103: 2994–2999

Sherson SM, Alford HL, Forbes SM, Wallace G, Smith SM (2003) Roles of cell-wall invertases and monosaccharide transporters in the growth and development of Arabidopsis. J Exp Bot 54: 525–531

Streb S, Zeeman SC (2012) Starch Metabolism in Arabidopsis. The Arabidopsis Book 10: e0160, doi/10.1199/tab.0160

Vandesteene L, Ramon M, Le Roy K, Van Dijck P, Rolland F (2010) A single active trehalose-6-P synthase (TPS) and a family of putative regulatory TPS-like proteins in Arabidopsis. Mol Plant 3: 406–419

Vargas WA, Pontis HG, Salerno GL (2008) New insights on sucrose metabolism: evidence for an active A/N-Inv in chloroplasts uncovers a novel component of the intracellular carbon trafficking. Planta 227: 795–807

Wang Y, Zhang W-Z, Song L-F, Zou J-J, Su Z, Wu W-H (2008) Transcriptome analyses show changes in gene expression to accompany pollen germination and tube growth in Arabidopsis. Plant Physiol 148: 1201–1211

Ward JM (2001) Identification of novel families of membrane proteins from the model plant Arabidopsis thaliana. Bioinformatics 17: 560–563

Williams LE, Lemoine R, Sauer N (2000) Sugar transporters in higher plants - A diversity of roles and complex regulation. Trends Plant Sci 5: 283–290

Wuest SE, Vijverberg K, Schmidt A, Weiss M, Gheyselinck J, Lohr M, Wellmer F, Rahnenführer J, Mering C, Grossniklaus U (2010) Arabidopsis female gametophyte gene expression map reveals similarities between plant and animal gametes. Curr Biol 20: 506–512

Yu HJ, Hogan P, Sundaresan V (2005) Analysis of the female gametophyte transcriptome of Arabidopsis by comparative expression profiling. Plant Physiol 139: 1853–1869