

Supplemental Table S1: Whole seed monosaccharide composition

Whole Seed AIR							
	Fucose	Arabinose	Rhamnose	Galactose	Glucose	Xylose	Galacturonic Acid
Col-0	7.68 +/- 0.23 ^a	236.91 +/- 4.25 ^{ab}	228.63 +/- 3.91	154.14 +/- 3.37	197.65 +/- 23.29	78.54 +/- 5.60	323.13 +/- 10.14 ^{ab}
<i>cesa5-1</i>	4.71 +/- 0.20^c	230.91 +/- 3.79 ^{ab}	214.66 +/- 2.31	134.93 +/- 5.04	102.47 +/- 26.74	64.78 +/- 3.43	300.81 +/- 10.12 ^{ab}
<i>sos5-2</i>	7.48 +/- 0.37 ^{ab}	246.08 +/- 16.13 ^a	228.01 +/- 20.24	163.09 +/- 10.80	161.37 +/- 24.42	83.46 +/- 8.04	335.25 +/- 28.72 ^a
<i>cesa5-1 sos5-2</i>	7.05 +/- 0.17^{ab}	244.37 +/- 3.86 ^{ab}	215.35 +/- 6.24	152.27 +/- 8.88	106.18 +/- 20.04	72.95 +/- 2.80	294.41 +/- 9.27 ^{ab}
<i>mum2-1</i>	6.84 +/- 0.31^{ab}	206.15 +/- 7.25 ^b	193.59 +/- 7.69	153.56 +/- 4.07	150.71 +/- 2.26	67.92 +/- 4.45	266.43 +/- 8.84^b
<i>cesa5-1 mum2-1</i>	4.1 +/- 0.62 ^c	233.20 +/- 7.15 ^{ab}	214.45 +/- 8.42	151.63 +/- 4.99	104.16 +/- 23.41	66.34 +/- 2.04	293.15 +/- 12.80 ^{ab}
<i>sos5-2 mum2-1</i>	5.44 +/- 1.01 ^{bc}	215.02 +/- 6.87 ^{ab}	238.61 +/- 21.04	143.44 +/- 4.52	163.05 +/- 15.71	73.63 +/- 3.12	260.79 +/- 7.38 ^b

These values are one representative biological replicate; similar results were obtained in three independent biological replicates.

Values are the mean +/- SE of four technical replicates, and are expressed as nmoles sugar normalized to milligrams of seeds. Values in bold represent a significant difference from wild type for single mutants, and a significant interaction between genes for double mutants (two-way ANOVA, $P < 0.05$). Letters correspond to different levels of values; values not connected by the same letter are significantly different (Tukey's HSD post-hoc analysis, $P < 0.05$).

Supplemental Table S2: Acid insoluble cellulose amounts.

	Col	<i>cesa5-1</i>	<i>sos5-2</i>	<i>cesa5-1 sos5-2</i>
Cellulose	125.37 +/- 13.88 ^a	63.26 +/- 12.61^b	99.52 +/- 11.30 ^{ac}	69.54 +/- 5.27^{bc}

These values are one representative biological replicate; similar results were obtained in three independent biological replicates. Values are the mean +/- SE of four technical replicates, and are expressed as mg cellulose normalized to grams of seeds. Values in bold represent a significant difference from wild type for single mutants, and a significant interaction between genes for double mutants (two-way ANOVA, $P < 0.05$). Letters correspond to different levels of values; values not connected by the same letter are significantly different (Tukey's HSD post-hoc analysis, $P < 0.05$).

Supplemental Table S3: Non-adherent mucilage monosaccharide composition.

	Fucose	Arabinose	Rhamnose	Galactose	Glucose	Xylose	Galacturonic Acid
Non-adherent mucilage in Water							
Col-0	0.05 +/- 0.007	0.27 +/- 0.03 ^a	30.95 +/- 2.3 ^a	1.53 +/- 0.14	2.16 +/- 0.73	2.26 +/- 0.28 ^a	30.21 +/- 3.02 ^a
<i>cesa5-1</i>	0.04 +/- 0.005	0.28 +/- 0.04 ^a	42.25 +/- 0.31^b	1.92 +/- 0.64	0.90 +/- 0.24	2.87 +/- 0.02^b	43.42 +/- 0.51^b
<i>sos5-2</i>	0.06 +/- 0.005	0.33 +/- 0.03^{ab}	42.27 +/- 2.67^b	2.23 +/- 0.64	6.00 +/- 2.24	2.81 +/- 0.16^{ab}	42.21 +/- 2.83^b
<i>cesa5-1 sos5-2</i>	0.05 +/- 0.006	0.45 +/- 0.05 ^b	43.91 +/- 1.48^b	2.95 +/- 0.54	1.74 +/- 0.78	3.27 +/- 0.19 ^b	45.28 +/- 0.39^b
Non-adherent mucilage in Na₂CO₃							
<i>Col-0</i>	0.14 +/- 0.009 ^{cde}	1.55 +/- 0.02	40.42 +/- 0.23 ^{cef}	4.52 +/- 0.10 ^{ef}	1.17 +/- 0.15 ^{be}	3.08 +/- 0.07 ^{bcd}	55.45 +/- 0.99 ^{cef}
<i>cesa5-1</i>	0.15 +/- 0.004^{de}	2.24 +/- 0.23	79.22 +/- 0.95^{bd}	7.38 +/- 0.45^{cd}	4.49 +/- 0.71^{ad}	5.06 +/- 1.50 ^{abc}	110.21 +/- 2.05^{bd}
<i>sos5-2</i>	0.16 +/- 0.01^{bc}	1.70 +/- 0.10	71.14 +/- 2.32^{ab}	9.01 +/- 1.38^{ab}	3.12 +/- 0.97^{ac}	5.57 +/- 0.19^{ab}	97.69 +/- 3.71^{ab}
<i>mum2-1</i>	0.13 +/- 0.005^e	1.23 +/- 0.03	15.35 +/- 0.69^f	1.95 +/- 0.35^g	0.48 +/- 0.08^a	1.33 +/- 0.18^d	24.16 +/- 0.50^f
<i>sos5-2 mum2-1</i>	0.20 +/- 0.02^{ab}	1.91 +/- 0.22	57.71 +/- 2.02^{de}	6.76 +/- 0.23 ^{de}	1.96 +/- 0.47 ^{de}	4.95 +/- 0.27 ^{bcd}	78.43 +/- 2.52^{de}
<i>cesa5-1 mum2-1</i>	0.16 +/- 0.008 ^a	1.39 +/- 0.05	20.10 +/- 0.93^{ef}	3.93 +/- 0.26 ^a	0.58 +/- 0.05^{ce}	1.72 +/- 0.12 ^{cd}	29.87 +/- 1.03^{ef}

These values are one representative biological replicate; similar results were obtained in three independent biological replicates.

Values are the mean +/- SE of four technical replicates, and are expressed as nmoles sugar normalized to milligrams of seeds. Values in bold represent a significant difference from wild type for single mutants, and a significant interaction between genes for double mutants (two-way ANOVA, P < 0.05). Values not connected by the same letter are significantly different as determined by Tukey's HSD post-hoc analysis (P < 0.05).

Supplemental Table S4: Genes, accession numbers, and mutant lines used in this study.

Gene	Accession	Mutant line	T-DNA line/TAIR accession	Reference
<i>CESA5</i>	AT5G09870	<i>cesa5-1</i>	SALK_118491	Mendu et al., 2011; Sullivan et al., 2011
<i>SOS5</i>	AT3G46550	<i>sos5-2</i>	SALK_125874	Xu et al., 2008; Harpaz-Saad et al., 2011
<i>FLY1</i>	AT4G28370	<i>fly1-1</i>	CS67936	Voiniciuc et al., 2013
		<i>fly1-2</i>	CS67937	
<i>MUM2</i>	AT5G63800	<i>mum2-1</i>	CS3904	Dean et al., 2007

Supplemental Table S5: Sequences of primers used in this study.

Gene	Purpose	Primer name	Sequence (5'-3')
<i>CESA5</i>	<i>cesa5-1</i> identification	<i>cesa5-1</i> LP	GCTGATCCTTTAAAGGCCGG
		<i>cesa5-1</i> RP	CCCGGATTTGACCATCACAAG
<i>SOS5</i>	<i>sos5-2</i> identification	<i>sos5-2</i> LP	GAAACTGGGAATAACCTTCGG
		<i>sos5-2</i> RP	AGCTTCTCGAGACCAAACCTC
	<i>SOS5</i> expression	SOS5-RT-FP	CCGTCCTCTCCTCTTTCCCTAATC TCTC
		SOS5-RT-RP	GATAGAGCGACGTTGAAGTTGTG TCCG
<i>GAPC</i>	<i>SOS5</i> expression	GAPC-FP	ACTCGAGAAAGCTGCTAC
		GAPC-RP	ATTCGTTGTCGTACCATG
<i>FLY1</i>	<i>fly1-2</i> identification	<i>fly1-2</i> LP	CGCAAGTTCAGATGCTAATGC
		<i>fly1-2</i> RP	AAAAAGGAACCGACAAACCTG
<i>MUM2</i>	<i>mum2-1</i> identification	MUM2 FP	CGTCAACAATGCACTAGAAG
		<i>mum2-1</i> FP	CGTCAACAATGCACTAGGAA
		MUM2 RP	CTAACTTTCTCTCCAAGCAAAC