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Supplementary Material

Evolution and expression analysis of the sorghum ubiquitin-conjugating enzyme family

Liqiang Jia^{A,B}, *QiuFang Zhao*^A and *Shu Chen*^A

^AKey Laboratory of Tropical Fruit Biology (Ministry of Agriculture), South Subtropical Crop Research Institute, Chinese Academy of Tropical Agricultural Science, Zhanjiang 524091, China.

^BCorresponding author. Email: liqiangj@zju.edu.cn

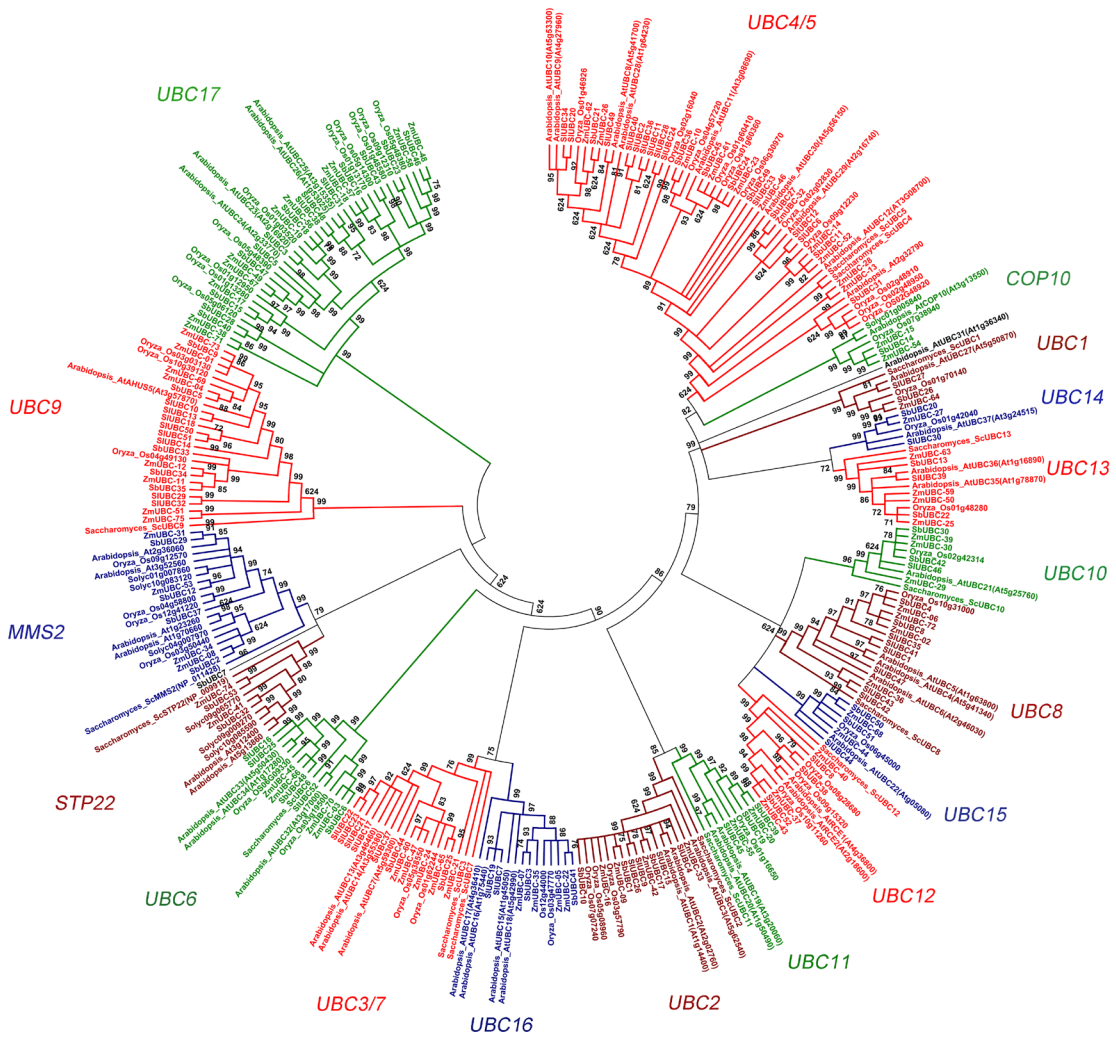


Fig S1. Phylogenetic tree (NJ tree) of SbUBC genes.

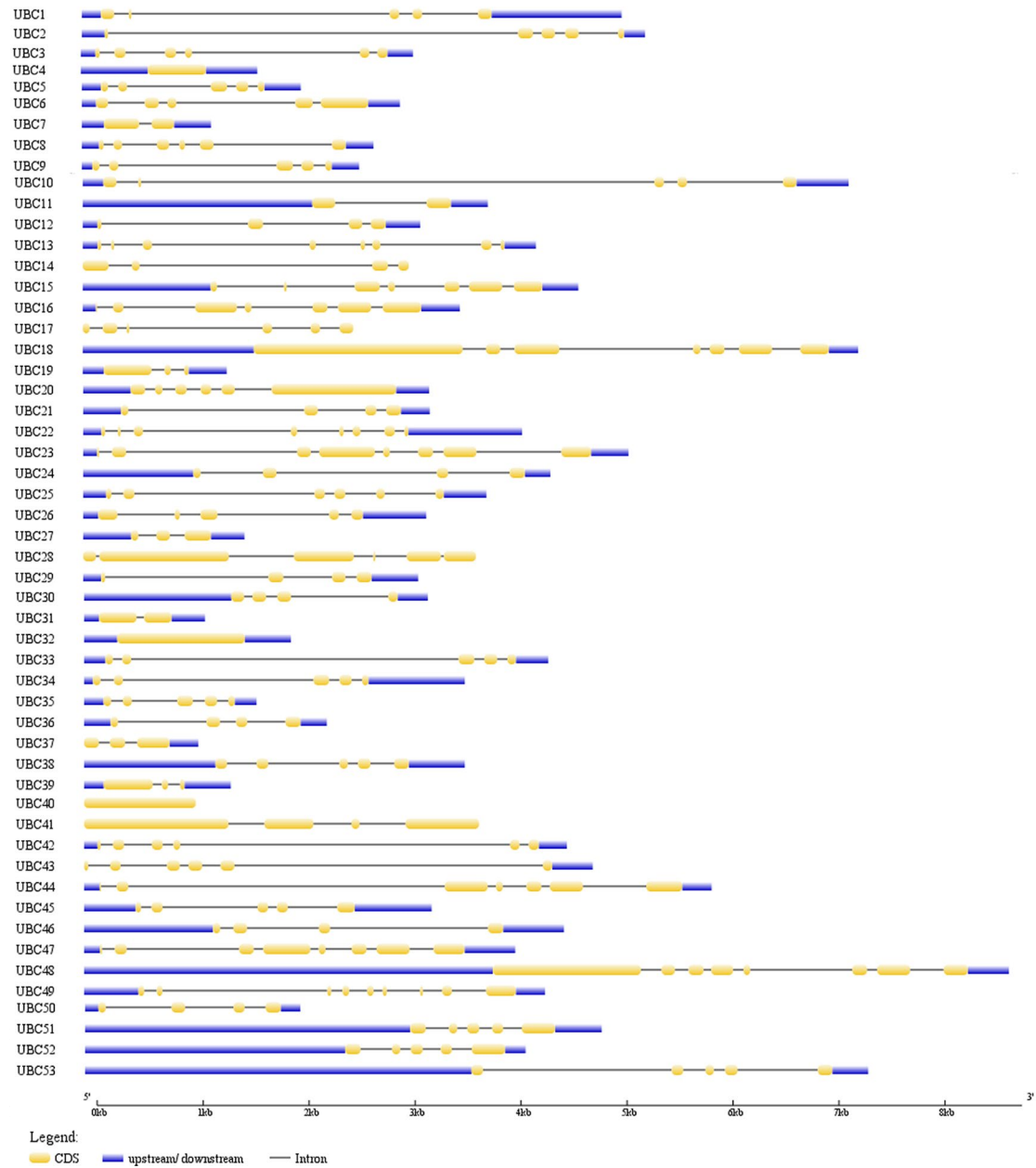


Fig S2. Exon/intron organization of the SbUBC family genes. Yellow boxes represent exons; black lines represent introns. The length of the boxes and lines are scaled relative to the length of the gene.

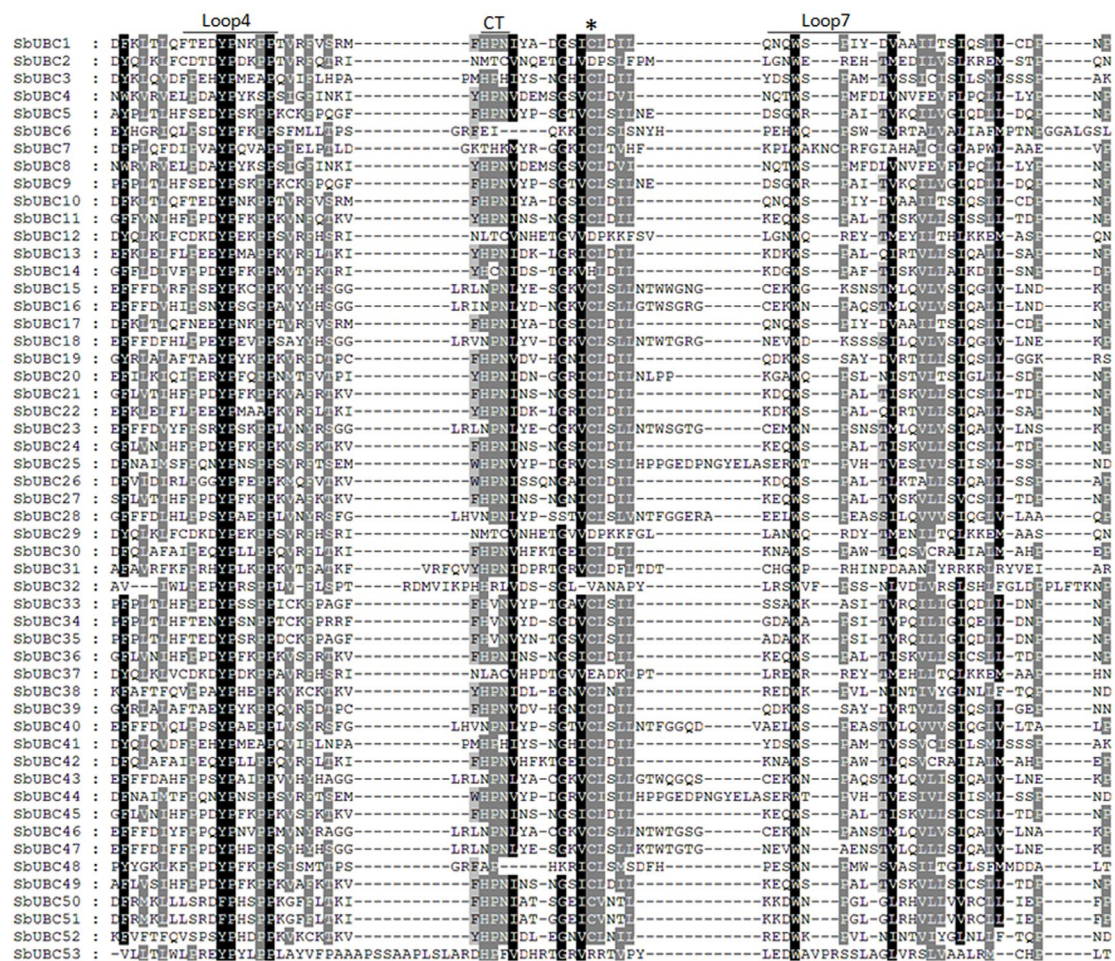


Fig S3. Multiple alignment of the region surrounding the active site of SbUBC proteins. Sequences were aligned by using Mafft program. Conserved residues are shaded in grey. The active-site cysteinyl residue indicated an asterisk on the top of the alignment. CT refers to the UBC tripeptide motif HPN, which is important for proper folding of the active-site region. Loop4 and Loop7 represent putative E3 binding loops.

Table S1. The primers used for the SbUBC genes in this study

Gene name	Gene locus	Forwar(5'→3')	Reverse(5'→3')
SbUBC1	Sb01g005570	GCGCCGCACGACAACAACATCAT	ACAGTTGGAGGTTTGTGGGGTAAT
SbUBC2	Sb01g010300	GGCATTGGTGATGGTACTGTGAGCT	CTGGAATCGAACAGTCGGTGGTTT
SbUBC3	Sb01g011940	CCCGTCTTCCCTCTCGTCGT	GCTTGTAGGTCTCGCCCGTGTAGA
SbUBC4	Sb01g020460	GGGGCCGACCGAAAGTATCTACCAA	GACAGAGCCAGACATCTCATCGACA
SbUBC5	Sb01g030580	GCCGCCATGTGCGGGAGGAAT	CCCACCTTCCCAATCAGTCCCCT
SbUBC6	Sb01g037440	GGCGGCAGGATAGAGGGTT	AATTGCCACTCGAAGATGTCCTCTCT
SbUBC7	Sb01g040860	AAGGACAACGACTGGTTCGCAT	CAGATCTTCCACCCCGGTACAT
SbUBC8	Sb01g047040	GGAGGGTTAGAGTAGAGCTGCCAGA	TCAAACATTGGGCTCCATGTCTGGT
SbUBC9	Sb01g049010	AGGATTACCCTAGCAAGCTCCCAA	TGGTCTCCAGCCGCTATCCTCAT
SbUBC10	Sb02g003870	CAACATCATGCTCTGGAACGC	TCCTAGAGACAAACCGAACAGT
SbUBC11	Sb02g019480	ACCCGAACAAACCACCAACTGT	GCAGGGGAGTTTGGGTTTGAT
SbUBC12	Sb02g020340	CCCGAGAAGCCACCATCTGTTCGA	TACTAGCTTGCGGTTCTGTGGGGA
SbUBC13	Sb02g021080	AGGAATCAGTGCCTCGCCATCAGA	GCTAAGCAATGCCTGGATGCTCA
SbUBC14	Sb02g037390	GCTATCCACCATCATCGGACCCCAA	CTCCAGCCATCCTCAGAATGTCCA
SbUBC15	Sb03g000670	AGAAAGGCAAATCCATTGACCCACT	CGCATAACAGTGCCAGTCCCCTT
SbUBC16	Sb03g000730	GCTCAGGCTCATCAATCCGAGCT	AGACTCATCTCTATCGTCCCTACCT
SbUBC17	Sb03g003510	CGCCCCGACAGATAACAACATAAT	CACGGTTGGTGGCTTGTTTGGA
SbUBC18	Sb03g007490	GGACAGCGTGTGAAGGCAGTGT	AGACACCAGTCAGTTAATTGCCAGT
SbUBC19	Sb03g010800	CGACATCTCGCTTCTGTTCTCGTCA	GGGCTTGTAGAGCTTCTCCACCAT
SbUBC20	Sb03g027230	CTGTCTTACAGTCAGGATTCAGCA	GTGACAGCCTCCTACGTTGCAT
SbUBC21	Sb03g030010	ACATCAACAGCAACGGGAGCAT	CCGGTCCGTCTTGTACATGTGAGCT
SbUBC22	Sb03g030840	ATATGCCTCGACATTCTCAAGGACA	TTCTACCTCATTGGCTTTCAGTGTCT
SbUBC23	Sb03g031060	AACCTCCGCTAGTGAATTACCGATCT	CGCCATTGATTGCTTCTCGCCTTGA
SbUBC24	Sb03g038120	ATCTGCTCCCTGTTACTGATCCCAA	GGCAACACCACAATCGTCTGCA
SbUBC25	Sb03g039320	GGGCGCGTGTGTATCTTATTCTT	TTGCTGGAGACTCGTCATTTGGACT
SbUBC26	Sb03g044480	ATATCCCTTTGAGCTCCGAAGAT	CAGGTGCAGGAGAAGAAAGCAGA
SbUBC27	Sb04g001680	CGGACTACCCCTTCAAACCTCCCAA	CAGACGGAGAGCAGCACCTT
SbUBC28	Sb04g002380	CCGCCTTACCAGCTCTACCT	GTGCCGCTGCTTCATGCTGT
SbUBC29	Sb04g011270	ACTATCTGAGAAGCCACCATCTGT	CTTGAGCTGGGTTAGGATGTTCTCCA
SbUBC30	Sb04g026910	CTCTGTTGCCTCTCAAGTTCGAT	TAAGTGGGCTGTCTGGTTCAGGAT
SbUBC31	Sb04g029610	ACCCGAACATCGATCCGAGGAC	GTGTTGCCTACGTAGCCTCCAG
SbUBC32	Sb04g038570	CAGCAACCAAGCCACCGAGGA	CGCTCCTGAGGTAGCCGTCAA
SbUBC33	Sb06g026250	CTCATGGTGTGGAAGTGCAT	ATGGGAGGGCTACTTGGGTAATCTT
SbUBC34	Sb06g026270	GGTCCGTCAACCTGATGCTCT	TGCAGGTGGAGGGTTACTTGGGT
SbUBC35	Sb06g026280-F	TTCCGGCAGGTTTCTTCCATGTCA	GCTGGGGAGGCTGGATTTGGATT
SbUBC36	Sb06g032120-F	TCGCACCAAGGTTTCCACCCGAA	TGAGCAATCTCAGGGACAAGAGGA
SbUBC37	Sb06g033510-F	CCCGCAACTTCCGTCTGCT	CGCAGTTGAGCGGGCCTATGAT
SbUBC38	Sb07g014850	GCCTGACGAAGGATACTACATGGGT	ATGTTACAGCAGACATTTCCCTCCA
SbUBC39	Sb07g025410	TTCACCGCCGAGTACCCTACAA	TCGTAGCGGAGGACCACTT
SbUBC40	Sb0011s003010	ATGTGCCACCCGCTGACACCC	TGCCAGCCTCGACACAAGCTC

SbUBC41	Sb08g022460-F	AGAGTCCTTGCACCTCACCTT	CGCAGCCCTTCTTGTGTCGTCGT
SbUBC42	Sb08g022990	TCAAGCACAAGGTCTCCGAT	GCCTCCATAGGGTAATGCTCA
SbUBC43	Sb09g007410	AAACGTGCATTTCAAGACTGG	ATTGAAAGCCTCTGATGTCACC
SbUBC44	Sb09g007960	CTCGGAAAATCGAATGGACCT	CACCTGCATGATAATGTACCACT
SbUBC45	Sb09g022600	ATGGAGGCTACTTCAATGCAA	CTCATAACCATTGGGATCCTCG
SbUBC46	Sb09g023560	ATGGCATCAAAGCGTATCCTC	AAAACACCGCCAGCATAGGGA
SbUBC47	Sb09g028100	TACTCCTTACCATGACGGTCT	AGGCACACCTTCCCACAAGC
SbUBC48	Sb09g028110	TCACAAACGGGTCATTAGCAA	CTGCACCTTGGATATCACACC
SbUBC49	Sb10g006220	ATCAGCATGACAACCCCTAGCG	TGCTTCCAGTTGTCAGTGCAT
SbUBC50	Sb10g020030	TTGCCGAAGATATGTTCCACT	AAGACAGATGCTCCCATTGCT
SbUBC51	Sb10g026320	GAGCTATATCTGAGTCGACCACA	GGTTCTGATCCTGCAAATTCGT
SbUBC52	Sb10g026330	AGGCTATACACTGGCATCCAC	TCACCGAGAACAGTATTGGAC
SbUBC53	Sb10g028930	TTTACGCAACCAAACGACGAGG	GTGTTGGCCTACGTAGCCTCCAG
	SB-ACTIN	ATCCAGGCCGTCCTCTCTGTAT	GGCTGACACCATCTCCCGAGT

Table S2. The information of SbUBC gene family identified in this study

Gene locus	NCBI Accession	Gene name	Size (aa)	MW (Da)	PI	Chr	Splice variants
Sb01g005570	XP_002461515	SbUBC1	152	17.32	5.716	1	2
Sb01g010300	XP_002466577	SbUBC2	161	18.35	4.909	1	1
Sb01g011940	XP_002464080	SbUBC3	165	18.59	8.186	1	1
Sb01g020460	XP_002467149	SbUBC4	183	20.83	4.14	1	1
Sb01g030580	XP_002465018	SbUBC5	160	17.99	8.279	1	1
Sb01g037440	XP_021306738	SbUBC6	313	34.21	6.11	1	2
Sb01g040860	XP_002465544	SbUBC7	181	20.25	7.801	1	1
Sb01g047040	XP_002465854	SbUBC8	183	20.95	4.176	1	1
Sb01g049010	XP_002468614	SbUBC9	160	18.05	8.281	1	1
Sb02g003870	XP_002461515	SbUBC10	152	17.31	5.716	2	1
Sb02g019480	XP_002462120	SbUBC11	148	16.66	6.744	2	1
Sb02g020340	XP_002462136	SbUBC12	148	16.76	6.861	2	1
Sb02g021080	XP_021309612	SbUBC13	153	17.16	7.241	2	2
Sb02g037390	XP_002460915	SbUBC14	187	20.22	8.78	2	1
Sb03g000670	KXG31475	SbUBC15	368	41.43	8.654	3	2
Sb03g000730	XP_002457065	SbUBC16	360	40.41	6.56	3	1
Sb03g003510	XP_002447355	SbUBC17	152	17.34	5.312	3	1
Sb03g007490	XP_002457448	SbUBC18	1106	12.22	4.439	3	1
Sb03g010800	XP_002457631	SbUBC19	234	25.69	8.295	3	1
Sb03g027230	XP_002455915	SbUBC20	569	61.68	8.656	3	1
Sb03g030010	KXG22164.1	SbUBC21	147	16.59	7.883	3	2
Sb03g030840	XP_002458301	SbUBC22	153	17.19	7.241	3	1
Sb03g031060	XP_002456132	SbUBC23	495	55.56	5.409	3	1
Sb03g038120	XP_002456543	SbUBC24	148	16.49	7.865	3	1
Sb03g039320	XP_002458736	SbUBC25	169	19.11	5.371	3	1
Sb03g044480	XP_002459014	SbUBC26	195	21.25	4.651	3	1
Sb04g001680	XP_021314861	SbUBC27	148	16.55	7.809	4	2
Sb04g002380	XP_002451466	SbUBC28	359	38.13	6.132	4	1
Sb04g011270	XP_002453723	SbUBC29	148	16.71	6.752	4	1
Sb04g026910	Sobic.004G224800	SbUBC30	157	17.77	8.454	4	1
Sb04g029610	XP_002452639	SbUBC31	209	23.29	10.472	4	2
Sb04g038570	XP_002454852	SbUBC32	401	43.43	7.69	4	1
Sb06g026250	XP_002448376	SbUBC33	159	17.74	9.082	6	1
Sb06g026270	XP_002448377	SbUBC34	159	17.92	8.608	6	1
Sb06g026280	XP_002448378	SbUBC35	159	17.84	8.99	6	1
Sb06g032120	XP_002448725	SbUBC36	148	16.51	7.871	6	1
Sb06g033510	XP_002447355	SbUBC37	161	18.00	5.605	6	1
Sb07g014850	XP_002444197	SbUBC38	183	20.72	8.219	7	1
Sb07g025410	XP_002444650	SbUBC39	188	20.05	4.878	7	1
Sb08g022460	XP_021321819	SbUBC40	981	10.71	4.6	8	1

Sb08g022990	XP_002443656	SbUBC41	161	18.23	7.825	8	1
Sb09g007410	XP_002439476	SbUBC42	157	17.73	8.445	9	1
Sb09g007960	XP_002439484	SbUBC43	460	51.73	4.963	9	1
Sb09g022600	KXG22164	SbUBC44	172	19.07	4.814	9	2
Sb09g023560	XP_002441271	SbUBC45	148	16.5	7.865	9	1
Sb09g028100	XP_002441499	SbUBC46	507	57.26	5.374	9	1
Sb09g028110	XP_002441500	SbUBC47	871	96.67	4.771	9	1
Sb10g006220	XP_002438001	SbUBC48	239	26.90	8.852	10	1
Sb10g020030	XP_002438462	SbUBC49	148	16.50	7.865	10	1
Sb10g026320	XP_002437403	SbUBC50	252	27.49	9.046	10	1
Sb10g026330	XP_021306136	SbUBC51	255	27.60	9.276	10	2
Sb10g028930	XP_002437536	SbUBC52	183	20.62	8.232	10	1
Sb0011s003010	KXG19006	SbUBC53	327	35.71	6.78	8	1

Table S3. List of UBCs used in this study

Species	Gene name	Gene locus	Ub/Ubl	
<i>Saccharomyces cerevisiae</i>	UBC1	YDR177W	UBC	
	UBC2/RAD6	UBC2_YEAST		
	UBC3/CYC34	YDR054C		
	UBC4	YBR082C		
	UBC5	YDR059C		
	UBC6	YER100W		
	UBC7/DER2	YMR022W		
	UBC8/GID3	YEL012W		RUB
	UBC9	YDL064W		SUMO
	UBC10/PEX4	YGR133W		UBC
	UBC11	YOR339C		
	UBC12	YLR306W		RUB
	UBC13	YDR092W		
	MMS2	YGL087C		UEV
	STP22	YCL008C		
	<i>Arabidopsis thaliana</i>	AtUBC1		At1g14400
AtUBC2		At2g02760		
AtUBC3		At5g62540		
AtUBC4		At5g41340		
AtUBC5		At1g63800		
AtUBC6		At2g46030		
AtUBC7		At5g59300		
AtUBC8		At5g41700		
AtUBC9		At4g27960		
AtUBC10		At5g53300		
AtUBC11		At3g08690		
AtUBC12		AT3G08700		
AtUBC13		At3g46460		
AtUBC14		At3g55380		
AtUBC15		At1g45050		
AtUBC16		At1g75440		
AtUBC17		At4g36410		
AtUBC18		At5g42990		
AtUBC19		At3g20060		
AtUBC20		At1g50490		
AtUBC21		At5g25760		
AtUBC22		Atg05080		
AtUBC23		At2g16920		
AtUBC24		At2g33770		
AtUBC25		At3g15355		
AtUBC26		At1g53025		
AtUBC27		At5g50870		

Oryza sativa

AtUBC28	At1g64230	
AtUBC29	At2g16740	
AtUBC30	At5g56150	
AtUBC31	At1g36340	
AtUBC32	At3g17000	
AtUBC33	At5g50430	
AtUBC34	At1g17280	
AtUBC35	At1g78870	
AtUBC36	At1g16890	
AtUBC37	At3g24515	
AtAHUS5	At3g57870	SUMO
AtRCE1	At4g36800	RUB
AtRCE2	At2g18600	
AtCOP10	At3g13550	UEV
	At5g13860	
	At3g52560	
	At3g12400	
	At2g36060	
	At2g32790	
	At1g70660	
	At1g23260	
	Os01g03520	UBC
	Os01g12950	
	Os01g13170	
	Os01g13280	
	Os01g16650	
	Os01g42040	
	Os01g46926	
	Os01g48280	
	Os01g48580	
	Os01g60360	
	Os01g60410	
	Os01g62244	
	Os01g70140	
	Os02g02830	
	Os02g16040	
	Os02g42314	
	Os02g48910	UEV
	OS02G48920	UEV
	Os02g48950	UBC
	Os03g03130	SUMO
	Os03g19500	UBC
	Os03g47770	
	Os03g50440	UEV

	Os03g57790	UBC	
	Os04g49130	SUMO	
	Os04g57220	UBC	
	Os04g58800	UEV	
	Os05g06120	UBC	
	Os05g08960		
	Os05g14300		
	Os05g38550		
	Os05g48380		
	Os05g48390		
	OS06G09330		
	Os06g30970		
	Os06g45000		
	Os07g07240		
	Os07g38940	UEV	
	Os08g28680	RUB	
	Os09g12230	UBC	
	Os09g12310		
	Os09g12570	UEV	
	Os09g15320	RUB	
	Os10g11260	RUB	
	Os10g31000	RUB	
	Os10g39120	SUMO	
	Os12g41220	UEV	
	Os12g44000	UBC	
<i>Zea mays L.</i>	ZmUBC-01	GRMZM2G070047	SUMO
	ZmUBC-02	GRMZM2G150867	RUB
	ZmUBC-03	GRMZM5G824629	UBC
	ZmUBC-04	GRMZM2G312693	SUMO
	ZmUBC-05	GRMZM2G007381	UBC
	ZmUBC-06	GRMZM2G053764	RUB
	ZmUBC-07	GRMZM2G116840	UBC
	ZmUBC-08	GRMZM2G022859	UEV
	ZmUBC-09	GRMZM2G120674	UBC
	ZmUBC-10	GRMZM2G102471	
	ZmUBC-11	GRMZM2G038851	SUMO
	ZmUBC-12	GRMZM2G341089	
	ZmUBC-13	GRMZM2G016176	UBC
	ZmUBC-14	GRMZM2G000601	
	ZmUBC-15	GRMZM2G113396	UEV
	ZmUBC-16	GRMZM2G022206	UBC
	ZmUBC-17	GRMZM2G010460	
	ZmUBC-18	GRMZM2G123519	
	ZmUBC-19	GRMZM2G086583	

ZmUBC-20	GRMZM2G002830	
ZmUBC-21	GRMZM2G434519	
ZmUBC-22	GRMZM2G018447	
ZmUBC-23	GRMZM5G866947	
ZmUBC-24	GRMZM2G007300	
ZmUBC-25	GRMZM5G862131	
ZmUBC-26	GRMZM5G814314	
ZmUBC-27	GRMZM2G157605	
ZmUBC-28	GRMZM2G106143	
ZmUBC-29	GRMZM2G461533	
ZmUBC-30	GRMZM2G161545	
ZmUBC-31	GRMZM2G027378	UEV
ZmUBC-32	AC233922.1_FGT008	UBC
ZmUBC-33	GRMZM2G007260	
ZmUBC-34	GRMZM2G090172	UEV
ZmUBC-35	GRMZM2G148130	UBC
ZmUBC-36	GRMZM2G146374	RUB
ZmUBC-37	GRMZM2G115939	RUB
ZmUBC-38	GRMZM2G466265	UBC
ZmUBC-39	GRMZM5G828302	
ZmUBC-40	GRMZM2G411771	RUB
ZmUBC-41	GRMZM2G147579	UEV
ZmUBC-42	GRMZM2G110983	UBC
ZmUBC-43	GRMZM2G102421	RUB
ZmUBC-44	GRMZM5G895435	UBC
ZmUBC-45	GRMZM2G116919	
ZmUBC-46	GRMZM2G156517	
ZmUBC-47	GRMZM2G012052	
ZmUBC-48	GRMZM2G085849	
ZmUBC-49	GRMZM2G381709	
ZmUBC-50	GRMZM2G007122	
ZmUBC-51	GRMZM2G433968	SUMO
ZmUBC-52	GRMZM2G173756	UBC
ZmUBC-53	GRMZM2G056501	UEV
ZmUBC-54	GRMZM2G072506	
ZmUBC-55	GRMZM2G007057	UBC
ZmUBC-56	GRMZM2G078360	
ZmUBC-57	GRMZM2G122003	
ZmUBC-58	GRMZM2G027546	
ZmUBC-59	GRMZM2G015287	
ZmUBC-60	GRMZM2G007276	
ZmUBC-61	GRMZM2G132759	
ZmUBC-62	GRMZM2G086088	
ZmUBC-63	GRMZM2G115828	

Sorghum bicolor

ZmUBC-64	GRMZM2G134176	
ZmUBC-65	GRMZM2G085600	
ZmUBC-66	GRMZM2G177276	
ZmUBC-67	GRMZM2G464572	
ZmUBC-68	GRMZM2G153924	
ZmUBC-69	GRMZM2G163398	SUMO
ZmUBC-70	GRMZM2G121303	UBC
ZmUBC-71	GRMZM2G440918	
ZmUBC-72	AC149818.2_FGT006	RUB
ZmUBC-73	GRMZM2G063931	SUMO
ZmUBC-74	GRMZM2G109582	UEV
ZmUBC-75	GRMZM2G146142	SUMO
SbUBC1	Sb01g005570	UBC
SbUBC2	Sb01g010300	UEV
SbUBC3	Sb01g011940	UBC
SbUBC4	Sb01g020460	RUB
SbUBC5	Sb01g030580	SUMO
SbUBC6	Sb01g037440	UBC
SbUBC7	Sb01g040860	
SbUBC8	Sb01g047040	RUB
SbUBC9	Sb01g049010	SUMO
SbUBC10	Sb02g003870	UBC
SbUBC11	Sb02g019480	
SbUBC12	Sb02g020340	UEV
SbUBC13	Sb02g021080	UBC
SbUBC14	Sb02g037390	UEV
SbUBC15	Sb03g000670	UBC
SbUBC16	Sb03g000730	
SbUBC17	Sb03g003510	
SbUBC18	Sb03g007490	
SbUBC19	Sb03g010800	
SbUBC20	Sb03g027230	
SbUBC21	Sb03g030010	
SbUBC22	Sb03g030840	
SbUBC23	Sb03g031060	
SbUBC24	Sb03g038120	
SbUBC25	Sb03g039320	
SbUBC26	Sb03g044480	
SbUBC27	Sb04g001680	
SbUBC28	Sb04g002380	
SbUBC29	Sb04g011270	UEV
SbUBC30	Sb04g026910	UBC
SbUBC31	Sb04g029610	UEV
SbUBC32	Sb04g038570	UBC

Solanum lycopersicum

SbUBC33	Sb06g026250	UBC
SbUBC34	Sb06g026270	SUMO
SbUBC35	Sb06g026280-F	UBC
SbUBC36	Sb06g032120-F	
SbUBC37	Sb06g033510-F	UEV
SbUBC38	Sb07g014850	RUB
SbUBC39	Sb07g025410	UBC
SbUBC40	Sb0011s003010	
SbUBC41	Sb08g022460-F	
SbUBC42	Sb08g022990	
SbUBC43	Sb09g007410	
SbUBC44	Sb09g007960	
SbUBC45	Sb09g022600	
SbUBC46	Sb09g023560	
SbUBC47	Sb09g028100	
SbUBC48	Sb09g028110	
SbUBC49	Sb10g006220	
SbUBC50	Sb10g020030	
SbUBC51	Sb10g026320	
SbUBC52	Sb10g026330	RUB
SbUBC53	Sb10g028930	UBC
SIUBC1	Solyc01g094810	RUB
SIUBC2	Solyc01g095490	UBC
SIUBC3	Solyc01g111680	
SIUBC4	Solyc02g067420	
SIUBC5	Solyc02g078210	
SIUBC6	Solyc02g083570	
SIUBC7	Solyc02g084760	
SIUBC8	Solyc02g085690	RUB
SIUBC9	Solyc02g087750	UBC
SIUBC10	Solyc02g093110	SUMO
SIUBC11	Solyc03g007470	UBC
SIUBC12	Solyc03g033410	
SIUBC13	Solyc03g044260	SUMO
SIUBC14	Solyc03g112720	
SIUBC15	Solyc03g113100	UBC
SIUBC16	Solyc03g123660	
SIUBC17	Solyc04g011430	
SIUBC18	Solyc04g078620	SUMO
SIUBC19	Solyc04g080810	UBC
SIUBC20	Solyc05g050230	
SIUBC21	Solyc05g054540	
SIUBC22	Solyc05g054550	
SIUBC23	Solyc06g007500	

SIUBC24	Solyc06g007510	
<i>SIUBC25</i>	Solyc06g063100	
SIUBC26	Solyc06g070980	
<i>SIUBC27</i>	Solyc06g072570	
SIUBC28	Solyc06g082600	
<i>SIUBC29</i>	Solyc07g021660	SUMO
SIUBC30	Solyc07g024070	UBC
<i>SIUBC31</i>	Solyc07g053960	
SIUBC32	Solyc07g062570	SUMO
<i>SIUBC33</i>	Solyc07g066080	UBC
SIUBC34	Solyc08g008220	
<i>SIUBC35</i>	Solyc08g081270	RUB
SIUBC36	Solyc08g081950	UBC
<i>SIUBC37</i>	Solyc09g009720	
SIUBC38	Solyc10g007000	
<i>SIUBC39</i>	Solyc10g007260	
SIUBC40	Solyc10g011740	
<i>SIUBC41</i>	Solyc10g012240	RUB
SIUBC42	Solyc10g012270	RUB
<i>SIUBC43</i>	Solyc10g012320	RUB
SIUBC44	Solyc10g081160	UBC
<i>SIUBC45</i>	Solyc11g065190	UBC
SIUBC46	Solyc11g071260	
<i>SIUBC47</i>	Solyc11g071870	
SIUBC48	Solyc12g013820	
<i>SIUBC49</i>	Solyc12g056100	
SIUBC50	Solyc12g088680	SUMO
<i>SIUBC51</i>	Solyc12g089030	
SIUBC52	Solyc12g099310	UBC
	Solyc01g005840	UEV
	Solyc01g007860	
	Solyc04g007970	
	Solyc09g009270	
	Solyc09g065770	
	Solyc10g083120	
	Solyc10g085590	
