

NIL ^{Z597}	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELRLHLRLARDLSAVDTPAPFLRAAFASISRRSKLLAAAFDDLLLCGAAGELPRASASLCIREVLLVLQRFK	100
NIL ^{M46}	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELRLHLRLARDLSAVDTPAPFLRAAFASISRRSKLLAAAFDDLLLCGAAGELPRASASLCIREVLLVLQRFK	100
ZH161	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELRLHLRLARDLSAVDTPAPFLRAAFASISRRSKLLAAAFDDLLLCGAAGELPRASASLCIREVLLVLQRFK	100
KO-ZS-1	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-ZS-2	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-1	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-2a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
Ko-MY-2b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-MY-3a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELTPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-3b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-MY-4a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELTPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-4b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-MY-5a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELPPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-5b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-MY-6a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-6b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-MY-7a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELTPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-MY-7b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
KO-ZH-1a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSRSSPIAR	100
KO-ZH-1b	MAGNPAAAAAPSSSGSSSVFLPPPSPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQDRRRLLGAPD	100
KO-ZH-2a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELTPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-ZH-2b	MAGNPAAAAAPSSSGSSSVFLPPPSPDGCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSRSSP	100
KO-ZH-3a	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSPVAAPPGARPVRRRHHARAVPARRVRVHLEAVQATGGVRVRPAAVRRRGGAAAVGVAVPAGGAPGAAAVQ	100
KO-ZH-3b	MAGNPAAAAAPSSSGSSSVFLPPPSPSDGELSGRCTAWRATCP PSTTRPRRSCAPRSRPSRGGPSYWRPRSTTCCCAAPRGSCRGRRRCACGRCSWCCSGSR	100
NIL ^{Z597}	AIVADCSARSMRLLLESDEMAEALRELNHDLATLLDLLPVVELGLADDVLDVLALASRQCRRCSAPASEEALKASVLSLIQEIEREIVPERERLEEIL	200
NIL ^{M46}	AIVADCSARSMRLLLESDEMAEALRELNHDLATLLDLLPVVELGLADDVLDVLALASRQCRRCSAPASEEALKASVLSLIQEIEREIVPERERLEEIL	200
ZH161	AIVADCSARSMRLLLESDEMAEALRELNHDLATLLDLLPVVELGLADDVLDVLALASRQCRRCSAPASEEALKASVLSLIQEIEREIVPERERLEEIL	200
KO-ZS-1	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR.	200
KO-ZS-2	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-1	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-2a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-2b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-MY-3a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-3b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-MY-4a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-4b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-MY-5a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-5b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-MY-6a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-6b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-MY-7a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-MY-7b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-ZH-1a	RAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-ZH-1b	AAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGDGGGRHRQPGELQ	200
KO-ZH-2a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-ZH-2b	IARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
KO-ZH-3a	GDRRRLGAPDAAAAGVRRDGGGAAGAQP RP GHAARPVAGRRAGARRRRARRPRPRVAPVPVAVLAGTGVGGGAEGERA VADTRDRAGDRAGAGEAGGDP	200
KO-ZH-3b	RSSPIARRAAGCGCCWSPTRWRRSCGSSTTTWPRCSTCCRSSSWGSPPTCSTSSPSRRASAGGARHRHSRRRR	200
NIL ^{Z597}	VEVGINDPASCSEIEISLEQEI GDRASEKNEGAASMIALVGLLRYAKCVLFSATPRPSDSNSKADVEAEDGEPPVP	300
NIL ^{M46}	VEVGINDPASCSEIEISLEQEI GDRASEKNEGAASMIALVGLLRYAKCVLFSATPRPSDSNSKADVEAEDGEPPVP	300
ZH161	VEVGINDPASCSEIEISLEQEI GDRASEKNEGAASMIALVGLLRYAKCVLFSATPRPSDSNSKADVEAEDGEPPVP	300
KO-ZS-1		300
KO-ZS-2	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-1	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-2a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-2b		300
KO-MY-3a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-3b		300
KO-MY-4a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-4b		300
KO-MY-5a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-5b		300
KO-MY-6a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-6b		300
KO-MY-7a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-MY-7b		300
KO-ZH-1a		300
KO-ZH-1b	RGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-ZH-2a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-ZH-2b		300
KO-ZH-3a	GGGRHQRPGELQRGDREPAGDRRPCLGEMDGLHDSRRPPVCQVRPVQRHASAFRFQFG	300
KO-ZH-3b		300
NIL ^{Z597}	RESIDRWFSFGKSTC PKTQGVLANLELVSNKALKNLSIKWCRENGVAMEACEASKSEQAQVAANKAALEAARMTASFLVKKLSVSFSPDAANRVVHEIR	400
NIL ^{M46}	RESIDRWFSFGKSTC PKTQGVLANLELVSNKALKNLSIKWCRENGVAMEACEASKSEQAQVAANKAALEAARMTASFLVKKLSVSFSPDAANRVVHEIR	400
ZH161	RESIDRWFSFGKSTC PKTQGVLANLELVSNKALKNLSIKWCRENGVAMEACEASKSEQAQVAANKAALEAARMTASFLVKKLSVSFSPDAANRVVHEIR	400
KO-ZS-1		400
KO-ZS-2		400
KO-MY-1		400
KO-MY-2a		400
KO-MY-2b		400
KO-MY-3a		400
KO-MY-3b		400
KO-MY-4a		400
KO-MY-4b		400
KO-MY-5		400
KO-MY-5b		400
KO-MY-6a		400
KO-MY-6b		400
KO-MY-7a		400
KO-MY-7b		400
KO-ZH-1a		400
KO-ZH-1b		400
KO-ZH-2a		400
KO-ZH-2b		400
KO-ZH-3a		400

KO-ZH-3b		400
NIL ^{ZS97}	LLSKSGSENRAFVGEAGAVPLLVPLLYSEDAGLQNAVTTALLNLSIT	500
NIL ^{MY46}	LLSKSGSENRAFVGEAGAVPLLVPLLYSEDAGLQNAVTTALLNLSIT	500
ZH161	LLSKSGSENRAFVGEAGAVPLLVPLLYSEDAGLQNAVTTALLNLSIT	500
KO-ZS-1		500
KO-ZS-2		500
KO-MY-1		500
KO-MY-2a		500
KO-MY-2b		500
KO-MY-3a		500
KO-MY-3b		500
KO-MY-4a		500
KO-MY-4b		500
KO-MY-5a		500
KO-MY-5b		500
KO-MY-6a		500
KO-MY-6b		500
KO-MY-7b		500
KO-MY-7b		500
KO-ZH-1a		500
KO-ZH-1b		500
KO-ZH-2a		500
KO-ZH-2b		500
KO-ZH-3a		500
KO-ZH-3b		500
NIL ^{ZS97}	QSVVEKLVHLVRTGPTSTKKDALAALLTLAGERENVGKLVDAAGVAEVALSAISKEETAAAVLAALAKRGGAEI	600
NIL ^{MY46}	QSVVEKLVHLVRTGPTSTKKDALAALLTLAGERENVGKLVDAAGVAEVALSAISKEETAAAVLAALAKRGGAEI	600
ZH161	QSVVEKLVHLVRTGPTSTKKDALAALLTLAGERENVGKLVDAAGVAEVALSAISKEETAAAVLAALAKRGGAEI	600
KO-ZS-1		600
KO-ZS-2		600
KO-MY-1		600
KO-MY-2a		600
KO-MY-2b		600
KO-MY-3a		600
KO-MY-3b		600
KO-MY-4a		600
KO-MY-4b		600
KO-MY-5a		600
KO-MY-5b		600
KO-MY-6a		600
KO-MY-6b		600
KO-MY-7a		600
KO-MY-7b		600
KO-ZH-1a		600
KO-ZH-1b		600
KO-ZH-2a		600
KO-ZH-2b		600
KO-ZH-3a		600
KO-ZH-3b		600
NIL ^{ZS97}	AALVLLCRRLGAPAVTQVMVPGVEWAIWELMSIGTERARRKAASLGRI	680
NIL ^{MY46}	AALVLLCRRLGAPAVTQVMVPGVEWAIWELMSIGTERARRKAASLGRI	680
ZH161	AALVLLCRRLGAPAVTQVMVPGVEWAIWELMSIGTERARRKAASLGRI	680
KO-ZS-1		680
KO-ZS-2		680
KO-MY-1		680
KO-MY-2a		680
KO-MY-2b		680
KO-MY-3a		680
KO-MY-3b		680
KO-MY-4a		680
KO-MY-4b		680
KO-MY-5a		680
KO-MY-5b		680
KO-MY-6a		680
KO-MY-6b		680
KO-MY-7a		680
KO-MY-7b		680
KO-ZH-1a		680
KO-ZH-1b		680
KO-ZH-2a		680
KO-ZH-2b		680
KO-ZH-3a		680
KO-ZH-3b		680

Figure S1. Amino acid sequences of OsPUB3 in the three recipients (NIL^{ZS97}, NIL^{MY46} and ZH161) and their homozygous mutants. The U-box motif and Armadillo repeat are highlighted in blue and green, respectively. Differences among the three recipients are highlighted in yellow. Differences between the mutants and the recipients are indicated in red letters.