

rice	: MTPAAVAPAPYPTTQGNPSGTLPLAAACMGNTNLEGLGASSSDHAAGPPPSR-RAFLARRHAAASSRSRPPPPASPAAPWNPFGGGGGGGTASQDGGIGGIAPGVVAGAGSGGGVAGG	: 125
Brachypodium	: ----MTSPHPFAPAPLPHGCGAATPLTPDSVA-PPHAPLAKKRHAATSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----RNGVKAIVRS	: 108
Setaria	: ----MPPAVADDFPRQNFSGPELAAAHMANPGLGLAPPAGPSPAGAPP-PSRAAPLAKKRHPAPSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----GGGAGNGIGGGVAGG	: 116
maize	: ----MPPAVADDFPRQNFSGPELAAAHMANPGLGLAPPAGPSPAGAPP-SSRAAPLAKKRHPAPSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----GGG-TDRITGGVAGG	: 74
sorghum	: ----MPPAVGPASPRQNPFGAELPAAACMANPGLGLAPPAGPSPAGAPP-PSRAAPLAKKRHPAPSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----GGGPGDGGVAGG	: 102
Arabidopsis	: ----MTSPHPFAPAPLPHGCGAATPLTPDSVA-PPHAPLAKKRHAATSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----RNGVKAIVRS	: -
rice	: AASATSQOFPVASSNG--EAPFVFGSVRSLPRFGGMAASAKLPEKMGNNOTRGESSVNA----NKRGRSSIFGVDLPGLVLSSENVNIPERLTOLNLC---TRNPLOG---DNPVKTFFVGG	: 240
Brachypodium	: NVSNFALSRRTASSCGDYTTSSVHYTEANAMCKLAUVSTIGNEAL-----VRIHSEATTVPTPTVFMSSGCAASTDVAASSSKNASAVANGTDDTIALKEPITPLINISGGPFOSENG	: 229
Setaria	: NGSFASGNTAAAGCHHYAPISVOADNAMPKSTOFNIGDQAPSRGRGHEHNGCPATATFGSTATITLSTNVAALRNMSAVNGLLDGGVLCZALIRMGSDILDDMSAGGNO	: 239
maize	: SVSQQPLPEAVSVASPTTAPFVFGSVRSLPRFGGMAASAKLPEKMGNNOTRGESSVNA----NKRGRSSIFGVDLPGLVLSSENVNIPERLTOLNLC---TRNPLOG---DNPVKTFFVGG	: 201
sorghum	: SVSQQPLPEAVSVASPTTAPFVFGSVRSLPRFGGMAASAKLPEKMGNNOTRGESSVNA----NKRGRSSIFGVDLPGLVLSSENVNIPERLTOLNLC---TRNPLOG---DNPVKTFFVGG	: 229
Arabidopsis	: ----MTSPHPFAPAPLPHGCGAATPLTPDSVA-PPHAPLAKKRHAATSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----RNGVKAIVRS	: -
rice	: NGSFSSGTSTSDVHRKSYASANANGVAELTQYIGNQAPLGRMG-----TESTDAPPVVVEGGNVSSEAPRTNDVSSGANTNPSTFNVTDTGTGLCFKETS-----	: 341
Brachypodium	: NVSNFALSRRTASSCGDYTTSSVHYTEANAMCKLAUVSTIGNEAL-----VRIHSEATTVPTPTVFMSSGCAASTDVAASSSKNASAVANGTDDTIALKEPITPLINISGGPFOSENG	: 346
Setaria	: NGSFASGNTAAAGCHHYAPISVOADNAMPKSTOFNIGDQAPSRGRGHEHNGCPATATFGSTATITLSTNVAALRNMSAVNGLLDGGVLCZALIRMGSDILDDMSAGGNO	: 346
maize	: NGSFASGNTAAAGCHHYAPISVOADNAMPKSTOFNIGDQAPSRGRGHEHNGCPATATFGSTATITLSTNVAALRNMSAVNGLLDGGVLCZALIRMGSDILDDMSAGGNO	: 346
sorghum	: NGSFASGNTAAAGCHHYAPISVOADNAMPKSTOFNIGDQAPSRGRGHEHNGCPATATFGSTATITLSTNVAALRNMSAVNGLLDGGVLCZALIRMGSDILDDMSAGGNO	: 346
Arabidopsis	: ----MTSPHPFAPAPLPHGCGAATPLTPDSVA-PPHAPLAKKRHAATSSRSRAQSPAPFNNPFGGGTGGQNNWGLSNGVSGS-----RNGVKAIVRS	: 71
rice	: ----DTPFOKSGGGSRQAEAFVSGSINSEGSVSSAMNSAFVPPSSVNNPFPDPSCLNIGGGVTQCKQSNISGYPSEAFVGG-----SDALSSHSKKVMDRGNVTGANKAF	: 452
Brachypodium	: ----GDSHQTEPFGGGPRAAAGVYGNSSGNSKDGKDPSTPANNASTSANVATSPPSTYNLNVRGVRHMKMTDANCLPETFTVFGNGSSSASEQSAFVVDGGNFPVSGPSIDR	: 467
Setaria	: PEVFTFGSGRAGPAGPFGKHAASSSDRSSEFFSANSNASSNSIFLSTANNAASADSPBKSTLISARGGVMSSQSMESGANCPPEALPG-RNGRSGVSSASAMDDGGNVTNDAN----	: 488
maize	: PKVFTFGSGRAGPAGPFGKHAASSSDRSSEFFSANSNASSNSIFLSTANNAASADSPBKSTLISARGGVMSSQSMESGANCPPEALPG-RNGRSGVSSASAMDDGGNVTNDAN----	: 452
sorghum	: PKVFTFGSGRAGPAGPFGKHAASSSDRSSEFFSANSNASSNSIFLSTANNAASADSPBKSTLISARGGVMSSQSMESGANCPPEALPG-RNGRSGVSSASAMDDGGNVTNDAN----	: 480
Arabidopsis	: ----PFHFRSGSGDPPSIFIGGRSNEGFVGGSGSHVRLQDEKIGIRVMEERAKIESEGKASRIFFPCHNLNSSFSGVYKGNNSVFAVEITPLLSNKLIDSSSRBT	: 183
rice	: TSVHGNMES--TTPARMKMLLHGAILSNNNKQDTHOPPEVSGGTAALFSSAAASMPFTSIQTNVSFELKNGGNLANEDIGNITHSRSDNDQYGPSPFVSSGSNAVPPSEGYAEHALQE	: 577
Brachypodium	: TSDQGSMS--SHIDPMKMLIYRILSKSKMDAASLOPPTFVRSASDSSSFAAAPP--SFTNFOTNASSSETKDSGNLADDIRKSTYAKSNNSNGVYRISNVFVFGSGSATAASEGAEHTPHD	: 590
Setaria	: TSDQGSMS--SHIDPMKMLIYRILSKSKMDAASLOPPTFVRSASDSSSFAAAPP--SFTNFOTNASSSETKDSGNLADDIRKSTYAKSNNSNGVYRISNVFVFGSGSATAASEGAEHTPHD	: 604
maize	: TSDQGSMS--SHIDPMKMLIYRILSKSKMDAASLOPPTFVRSASDSSSFAAAPP--SFTNFOTNASSSETKDSGNLADDIRKSTYAKSNNSNGVYRISNVFVFGSGSATAASEGAEHTPHD	: 510
sorghum	: TSDQGSMS--SHIDPMKMLIYRILSKSKMDAASLOPPTFVRSASDSSSFAAAPP--SFTNFOTNASSSETKDSGNLADDIRKSTYAKSNNSNGVYRISNVFVFGSGSATAASEGAEHTPHD	: 537
Arabidopsis	: G-----HVIDSSKMLISERGTDOKONNVKVKVMDLVGKILSODLSKRLSIVG-----	: 234
rice	: DIKKLININREGA--SVGSKVNGSSQSVRSKAEIPVFGATOPNPESRAFSHSIHSSSESTSGNDMSSEKTIINTASDTIGES--CAVRJEPAWCSRESLFGILVYKSAVRDKK-BAHNAR	: 699
Brachypodium	: INKLININMEGFS--VCIOVNASIPDSQCHAEIMFGCTVIRPKVQSCPTIRLHSHISTFTEPVSSSSSLNPMADAGKEHAGES--GAUKODLGRSRESLFGILVYKSAVRDKK-BAHNAR	: 712
Setaria	: EIKKLININREGPFLGCTKLINSAAPGLTQSKADSTGCGAVIR-PROKSHFHLANLSCSSFSSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-VYHSKR	: 727
maize	: -----SKENITPTPEQFQSTGTGSGYCAVITQVQSYPTILANCTFSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-BAHNAR	: 620
sorghum	: -----SKENITPTPEQFQSTGTGSGYCAVITQVQSYPTILANCTFSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-BAHNAR	: 645
Arabidopsis	: -----SMITLGNHSGDSGVSNEKKVHDFNSSCPNTSFVGLPSPQNLNARNVHVSSTVNTSDTFVFNQDSVKTGMFETFPNSKVNFSLDGLGIFNARISVGATTAR	: 345
rice	: KKKRTRRLKHOAQCPHFHFACTTTGCPMDLACDPSMDGSPSPATVYCAKAAAGVSSGSHHLYGVSQSSCAAE-LVSAEHLVHDADPTCEDEGRHINTTANSEASSESSDEEVTIP	: 825
Brachypodium	: KKKRTRRLKHOAQCPHFHFACTTTGCPMDLACDPSMDGSPSPATVYCAKAAAGVSSGSHHLYGVSQSSCAAE-LVSAEHLVHDADPTCEDEGRHINTTANSEASSESSDEEVTIP	: 838
Setaria	: KKKRTRRLKHOAQCPHFHFACTTTGCPMDLACDPSMDGSPSPATVYCAKAAAGVSSGSHHLYGVSQSSCAAE-LVSAEHLVHDADPTCEDEGRHINTTANSEASSESSDEEVTIP	: 848
maize	: KKKRTRRLKHOAQCPHFHFACTTTGCPMDLACDPSMDGSPSPATVYCAKAAAGVSSGSHHLYGVSQSSCAAE-LVSAEHLVHDADPTCEDEGRHINTTANSEASSESSDEEVTIP	: 745
sorghum	: KKKRTRRLKHOAQCPHFHFACTTTGCPMDLACDPSMDGSPSPATVYCAKAAAGVSSGSHHLYGVSQSSCAAE-LVSAEHLVHDADPTCEDEGRHINTTANSEASSESSDEEVTIP	: 770
Arabidopsis	: KGGGPOPVKVNIGREFAFAPSAIPNGSNEAPEALSPMDTSPPEVTEVCREFSATTPPTAPNVLDAEVAATERMEINSGDEVNNYQAEFNTGNCAEDHEDLAGDSISGAETSEPKAAEMETSS	: 472
rice	: IAPFSSSNHDTANCKPKSPAPEVWDADYRIANQOQAYEACHTAETICEHATFESSPESGHAETFASTSSSSSVSTIRNRKKRRTKSKQLPSPVTOQAYVQKSSDTHVQSPETK	: 952
Brachypodium	: NASPSPNNINWGADEPKMCTTEAWFDGYCENKVGKTCEDTSKLRSSEHPLANLSCSSFSSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-VYHSKR	: 965
Setaria	: NASPSPNNINWGADEPKMCTTEAWFDGYCENKVGKTCEDTSKLRSSEHPLANLSCSSFSSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-VYHSKR	: 975
maize	: NASPSPNNINWGADEPKMCTTEAWFDGYCENKVGKTCEDTSKLRSSEHPLANLSCSSFSSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-VYHSKR	: 847
sorghum	: NASPSPNNINWGADEPKMCTTEAWFDGYCENKVGKTCEDTSKLRSSEHPLANLSCSSFSSTFTEPVSSSGTMAEGETHADD--CVVKDGLGSRRETLTGLDLSIKSAVRDKK-VYHSKR	: 872
Arabidopsis	: ETTFATASEE-----VTSRSPORKENDHLSNDAASSSTFSGASSSGVGLPLTSKRNIRKKNPTKLGQDYVILINPATIKSSSHPLTGVGSHFT	: 570
rice	: ACDS-----ADQSGRGASTSALECECTWRISGNMAYANGHATAEDVYTGINSVSGHDSYGCRRALMCLYSNRAATRMGLQMSALODCHTASIDPFLKAYVRAACGL	: 1063
Brachypodium	: TEHS-----SKE-----LSAHECECTWRISGNMAYANGHATAEDVYTGINSVSGHDSYGCRRALMCLYSNRAATRMGLQMSALODCHTASIDPFLKAYVRAACGL	: 1069
Setaria	: NEDS-----LKEQATGDSSTSALECECTWRISGNMAYANGHATAEDVYTGINSVSGHDSYGCRRALMCLYSNRAATRMGLQMSALODCHTASIDPFLKAYVRAACGL	: 1086
maize	: NEDS-----VKAQCRDSSSTSALECECTWRISGNMAYANGHATAEDVYTGINSVSGHDSYGCRRALMCLYSNRAATRMGLQMSALODCHTASIDPFLKAYVRAACGL	: 958
sorghum	: NODS-----VKEQFRDSSSTSALECECTWRISGNMAYANGHATAEDVYTGINSVSGHDSYGCRRALMCLYSNRAATRMGLQMSALODCHTASIDPFLKAYVRAACGL	: 983
Arabidopsis	: GKPSERDPLTRLHFKPINNSVMEKRIEKDVNNAEACCEKRLRLGNMAYKGLDSRAESSVYTGIDSVPRIESRNCRRALMCLYSNRAATRMGLQMSALODCHTASIDPFLKAYVRAACGL	: 697
rice	: ALGLEDASRYVKKILGSSSDICVPRKIVCAESGLOKACVSECPHAGRRRLTDLTDALELIDSLITSTYSEKLTWRKSHALLIRKYEVLILCEQTVLACKNSPPD-----SH	: 1179
Brachypodium	: ALGLEDASRYVKKILGSSSDICVPRKIVCAESGLOKACVSECPHAGRRRLTDLTDALELIDSLITSTYSEKLTWRKSHALLIRKYEVLILCEQTVLACKNSPPD-----SH	: 1196
Setaria	: ALGLEDASRYVKKILGSSSDICVPRKIVCAESGLOKACVSECPHAGRRRLTDLTDALELIDSLITSTYSEKLTWRKSHALLIRKYEVLILCEQTVLACKNSPPD-----SH	: 1212
maize	: ALGLEDASRYVKKILGSSSDICVPRKIVCAESGLOKACVSECPHAGRRRLTDLTDALELIDSLITSTYSEKLTWRKSHALLIRKYEVLILCEQTVLACKNSPPD-----SH	: 1084
sorghum	: ALGLEDASRYVKKILGSSSDICVPRKIVCAESGLOKACVSECPHAGRRRLTDLTDALELIDSLITSTYSEKLTWRKSHALLIRKYEVLILCEQTVLACKNSPPD-----SH	: 1109
Arabidopsis	: ALGLEDASRYVKKILGSSSDICVPRKIVCAESGLOKACVSECPHAGRRRLTDLTDALELIDSLITSTYSEKLTWRKSHALLIRKYEVLILCEQTVLACKNSPPD-----SH	: 815
rice	: -TTTTSGHLPDILIKKYLHCKPDALELHKKHQTIVKSGRSGSCFSSSLITRELLHKKAGNNAFWRKRSVAVDYSAAALANSSRPFSVAVFCNRAAYQALGOVTDATDCSL	: 1305
Brachypodium	: SKKAPGCSLAPFLIKKYLHCKPDALELHKKHQTIVKSGRSGSCFSSSLITRELLHKKAGNNAFWRKRSVAVDYSAAALANSSRPFSVAVFCNRAAYQALGOVTDATDCSL	: 1323
Setaria	: SKKAPGCSLAPFLIKKYLHCKPDALELHKKHQTIVKSGRSGSCFSSSLITRELLHKKAGNNAFWRKRSVAVDYSAAALANSSRPFSVAVFCNRAAYQALGOVTDATDCSL	: 1339
maize	: SKKAPGCSLAPFLIKKYLHCKPDALELHKKHQTIVKSGRSGSCFSSSLITRELLHKKAGNNAFWRKRSVAVDYSAAALANSSRPFSVAVFCNRAAYQALGOVTDATDCSL	: 1211
sorghum	: SKKAPGCSLAPFLIKKYLHCKPDALELHKKHQTIVKSGRSGSCFSSSLITRELLHKKAGNNAFWRKRSVAVDYSAAALANSSRPFSVAVFCNRAAYQALGOVTDATDCSL	: 1236
Arabidopsis	: DTPKDNFTHQCHMFKSSYKKEPDAIASLKKCOLLSATKRENGKTLSSPTLAATIRELLHKKAGNNAFWRKRSVAVDYSAAALANSSRPFSVAVFCNRAAYQALGOVTDATDCSL	: 942
rice	: AMVLDTNYKAISRRTATFVMIRDYQAAANDVKKILLELKKVNV-----GVSYPKAFKHKDLQKHAHRLSSIDEAKNTPLNLYLILGVSESSPDIKKAYRKAALRHHPDKAQCILLRNEADE	: 1429
Brachypodium	: AMVLDTNYKAISRRTATFVMIRDYQAAANDVKKILLELKKVNV-----GVSYPKAFKHKDLQKHAHRLSSIDEAKNTPLNLYLILGVSESSPDIKKAYRKAALRHHPDKAQCILLRNEADE	: 1447
Setaria	: AMVLDTNYKAISRRTATFVMIRDYQAAANDVKKILLELKKVNV-----GVSYPKAFKHKDLQKHAHRLSSIDEAKNTPLNLYLILGVSESSPDIKKAYRKAALRHHPDKAQCILLRNEADE	: 1463
maize	: AMVLDTNYKAISRRTATFVMIRDYQAAANDVKKILLELKKVNV-----GVSYPKAFKHKDLQKHAHRLSSIDEAKNTPLNLYLILGVSESSPDIKKAYRKAALRHHPDKAQCILLRNEADE	: 1335
sorghum	: AMVLDTNYKAISRRTATFVMIRDYQAAANDVKKILLELKKVNV-----GVSYPKAFKHKDLQKHAHRLSSIDEAKNTPLNLYLILGVSESSPDIKKAYRKAALRHHPDKAQCILLRNEADE	: 1360
Arabidopsis	: AMVLDTNYKAISRRTATFVMIRDYQAAANDVKKILLELKKVNV-----GVSYPKAFKHKDLQKHAHRLSSIDEAKNTPLNLYLILGVSESSPDIKKAYRKAALRHHPDKAQCILLRNEADE	: 1068

# HPD

rice	: GWRVWKEVWADADHLPKFTIGAYNVLSDGKREEVNEDDLNARNVSSRSMHRSFPONYNNGRGNPRQWSSRSGSRWSGDDDYW-----	: 1526
Brachypodium	: GWRVWKEVWADADHLPKFTIGAYNVLSDGKREEVNEDDLNARNVSSRSMHRSFPONYNNGRGNPRQWSSRSGSRWSGDDDYW-----	: 1546
Setaria	: GWRVWKEVWADADHLPKFTIGAYNVLSDGKREEVNEDDLNARNVSSRSMHRSFPONYNNGRGNPRQWSSRSGSRWSGDDDYW-----	: 1555
maize	: GWRVWKEVWADADHLPKFTIGAYNVLSDGKREEVNEDDLNARNVSSRSMHRSFPONYNNGRGNPRQWSSRSGSRWSGDDDYW-----	: 1427
sorghum	: GWRVWKEVWADADHLPKFTIGAYNVLSDGKREEVNEDDLNARNVSSRSMHRSFPONYNNGRGNPRQWSSRSGSRWSGDDDYW-----	: 1453
Arabidopsis	: RHWKEHGFVWKEHLPKFTIGAYNVLSDGKREEVNEDDLNARNVSSRSMHRSFPONYNNGRGNPRQWSSRSGSRWSGDDDYW-----	: 1165

**Figure S2. Sequence alignment of DJC31 homologs from Arabidopsis (DJC31), *Brachypodium distachyon* (Bradi2g27160), millet (*Setaria italica*, SiPROV000210m), maize (GRMZM2G348697), sorghum (Sb09g018680), and the re-annotated rice DJC31 homolog, OsDJC31.**

OsDJC31 (GenBank accession: BK008486) was re-annotated from the continuous genomic region covered by loci LOC\_Os05g31056 and LOC\_Os05g31062. The J domain is underlined in blue. The position of the HPD tripeptide is indicated.