

Figure S8. Y.-Sakakibara and Nakabayashi et al.

CsF7G6" RhaT\_Cs1\_6RhaT  
PhA3G6" RhaT  
AtA3G2" XyIT\_UGT79B1  
AtF3G2" GlcT\_UGT79B6  
PGSC0003DMG400007981  
IpA3G2" GlcT  
AcA3Ga2" XyIT\_AcF3GGT1  
SOLYC10G008860.1  
BpA3G2" GlcAT  
CmF7G2" RhaT

**M**HAPSQNHHKGTESAEADQLHVVMPFWASGLISPFVQLSNKLSLHGKVKSFFSAPGNPRIKS--SLNLTPMADIPLQIHPVD-GLPPGLDSTSEMT 97  
**M**ENEMKHSN-----DALHVVMPFFAGHISPFVOLANKLSSYGVKSFATASNARVKS--MLNSAPTTHIVPLTHPVE-GLPPGAESTAELT 88  
**M**GVF-----GSNESSSMSIVMPWLAFCGHTPFLHLSNKLAKGKHKVFLPKKALNQLEP--LNLYPNLITFHITSIPQVK-GLPPGAESNDVP 88  
**M**G-----SKFHAFMFNFGFGMTAFLHLANKLAEKDHKUTFLPKKARQLES--LNLPDC1VFQTLTIPSVD-GLPDGAETSDIP 81  
**M**-----SKLEIVMPWNAFGMIPCMNLSELAKRGHKUSFLPKNAKIRLOK--LNLYPNLITFYKLTIPHVD-GLPYGAETADVP 80  
**M**G-----QATTYHIMAMYWPGVGHLTGFRLANKLAGKGHRUSFLPKNTQSKLES--FNLPHPLISFPIVVSIP-GLPPGAETSDVP 84  
**M**G-----APTFHIAWMYPWFALGHITPFLHLSNKLARKGHKUSFLPKTQKLEP--FNLHPDLITFIPVTVPHVD-GLPLGAETSDVP 82  
**M**E-----DKLTLFIIMYIWYAMGHTSFLHLSNKLARHGHKVFVHPTNTLSKLEK--FNRYPELINFKSVTVPHVD-GLPLGAETSDVP 82  
**M**DSKID-----SKTRVWMLPWLAISIISRFVLFAKRLTNNHNFHYICSSQTNMQYLNQNLTSQYSKSIQLIELNLSSS-ELPQYHITHGLP 88  
**M**DTKHQ-----DKPS-IILMLWLWLAHGHIAPHLELAKLISQKNHFIIFCSTPNLQSFRGRNVKEFNSSSIQIELQLPNTFPELPSQNTKRN 88

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**P**HMAELLKQALDMQPQIKTLLSQLKPHVFVFFDTHYLWPLGLVGSQGLIKTVNFSVSAISQAYLVVPAR--KLNN----SLADLMKSPDGFPATTSITSL 191  
**P**ASAELLKVALDMQPQIKTLLSHLKPHFVLFDFAQEWLPKMAN-GLGIKTKVYYSVVA1STAFLTCPAR-VLEPKKYSLEDMKKPPLGPQPTSVTSV 185  
**F**FLTHLAVAMQDQTRPEVETIFRTIKPDLFVYDFAH-WIPEIAKPIG-AKTCFCNIVSAAASIALSVPASEREVIDGKEMSGEELAKTPLGYP-SSKVVL 185  
**I**SLGSFISASAMDTRIQLVKEAVSVGKPDLIIFDFAH-WIPEIAREYG-VKSVNITISAAACVAFSVP-----GR-SQDDLGSTPPGYP-SSKVLL 168  
**K**SLESLSLATTIDFELDEYDIEKSFQNLKPHVFVFDIAY-WILDAREIGIKTLCFTVFSPAASAIPIFKVSP-----DKTASTAELVKPPLDYP-STVTL 173  
**F**PSTHLMASMDKTQNDIEIILKDLKVDVVFYDTH-WLPLSLARKIG-IKSVFYSTISPLSMHGKYALSPERR--VVGQLTEADMMKAPASFDP-SIPL 178  
**Y**PLQTLIIMARTDEYKVEDVLLKLDVVFYDTH-WMPSVAKRLGK-IKSVNYCIISPATIYTMSPARQ--LQGRELTEADLMVPPGYP-DFLIRL 176  
**I**FNQNLICQALDLTLPKIESLQEIKPHFIFYDFAW-WPVSVARKYG-VKSVHYCSITPSSVGYLMRGE-----NPTSEAEMMQPPPFGFVDSIIML 172  
**P**HLTKTISDDYQKSGPDFETILIKLNPHLVYD-FNQLWAPEVASTLH-IPSQQLLSCGVALLYDAHL-----YTKP-LDENLAKFPFP 170  
**P**HЛИТЛВГАФЕДАКАФСНІЛЕТЛКПТЛВМУД-ЛФРММАЕАЯҚҮД-ІААІЛFLPLСАВАСФЛЛН-----ІВНПСЛКРРФФЕДЫ 171

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SOLYC10G008860.1  
BpA3G2" GlcAT  
CmF7G2" RhaT

**D**EFLARDYLYVYTKFNG---GPSVYERGIQGVD-GCDVLA1KTCNEMEG PYLDVFVTRQFKKPVLLTGFLVNPPEPPSGELEWERWANW[GKFPKPSV]IYC 285  
**R**TFEARDFLYVFKSFHN---GPTLYDRIQSGLR-GCSAILAKTCNSQMEGPYIKYVEAQFNKPFSN-RTRSSG-PASGKLEEKWATW[NKFEGGT]IYC 278  
**R**PHEAKLSFVIRKHEA---IGSFFDGKVTAAMP-NCDAI1AIRTCTE[EGKFCDYI1SQYSKPVLYTGPVLPGSQNPQSLDQWAELAKFVNHGWSVFC 280  
**R**GHETNSLSFLSYPGFD---GTSFYERIIMGLK-NCDVI1RTQME[GKFCDFI1ENQFQRKVLLTGPMLEPDNSKP-LEDOWRQWLSKFDPGSV]IYC 262  
**R**ENEAKLLSFLFHEYKG---GVTFYERVKKGMT-GCDAIGMRCTKE[EGTFCDYI1ATHSEKPVLYTGPVLAE-TKGPLEEHGLSDWLEKEFEAGSVFC 267  
**R**HAHEARGFTARTVMKFG---GD1TFDFR1FTA[V-ESDGLAYSTCREI]EGQFCDYI1EQFQKPVLLAGPALPVP-SKST-MEQKWSDWL[GKFKEGSV]IYC 272  
**R**RTHEARAFARRVMKFG---GDTRFCDRNFISFS-ECDAMGFKTCREI[EGPYCDYLESQFGKPVLLSGPV]IPEP-PTSP-LEE[IWAKWLGFRAGSV]IYC 270  
**R**HKHEARLIIALHSMGKNGSGSGSFSVFTORMLLAQO-DGDAIAFKTREI[EGRYCEFVEHKFKKPVVLAGGPVLPEP-METSNEENWSKWLEKFQOKETVILC 270  
**R**EIYPKNR---DIPKGK---SKY1ERFVDCMRRSCEIILVRSTMELEGKYIDYLSKTLGKVLPGVPLVQEA-SLLQDDHIWIMKWLWDKKEESSVVVF 260  
**R**DRESKNINYFLHTANG---TLNKDRFLKAELSCFKVF1KTSREI[E SKYLDYFPLSMGNIEIIPVGPLIQEPT-FKFVDD-TKIMDWLSQKEPRSWY 264

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**S**FGSETFLTV-DQ1KELAIGLEITEGLPFLVLFNFPNVQDQSELVRLTPGFMDRV-KDRGVVHTGIVQQLI1RHEISVGCYVCHAGFSSVTEAVIS-D 381  
**S**FGSETFLTD-DQVKELALGQEQTGLPFLVLFNFPANVDVSAELNRLAPEGLERVK--DKG1IHSGIVQOQN1LAHSSVGCYVCHAGFSSVTEAVLN-D 374  
**A**FGSQPWNKIDQFQELCLGQESTGFPFLVAIKPPSGVS---TVEEALPEGFKERVQ--GRGVVFGGIVQOPLVNLPSVGCYVSHOGFGSWSLMS-D 374  
**A**LGSQIILEK-DQFQELCLGQELTGLPFLVAKVPPKGSS---T1QEA1PLKGFEEVK--ARGVVWGGIVQOPLI1AIPSI1GCVSHOGFGSWSLALVN-D 355  
**A**FGSQMILEK-KQFQQLVLGQELIELPFLVVKPGPEGTN---SVEEALPEGFKERVQ--EKG1ILDQWPOLE1LTKSVGCYVTHOGYGSWSLALCD 361  
**A**FGSECTLRK-DKFQELWLQELTGMPPFAALKPPFTE--SVEA1PEELKE1Q-GRG1VGEWQCOLFLQPSVGCYVSHOGWSLALCD 365  
**A**FGSECTLKM-NQFQELLLGQVLTGMPLFLAVLKPP1GAK--SVEEALPEGFKETGVE--GRGVVHEGWQCOL1I1EPSPVGCYVTHOGGSGLSSEALFN-K 363  
**A**FGSECKLKR-DQFQELWLQELTGYPFLA1KPP1EAD---T1EALPEGFKERTQ--GKG1VHSQNAEQLMUSPSVGCYVTHOGGSGLSSEALIN-E 363  
**C**FGSEYILSD-NEIEDIAYGLELSQVSFVWA1RAKT-----SALNGFIDRVG--DKGLV1DQWPCAN1LSHSS1GG1ISHOGNSSTMESIRY-G 346  
**S**FGSEYFPST-DEIHDA1G1LLTEVN1IWAFLRHPDEK-MTIEALPQGFAEE1ERNNK1IIVQGWPQAK1R-HS1GGFLSHOGWSVVEGMVF-G 360

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SOLYC10G008860.1  
BpA3G2" GlcAT  
CmF7G2" RhaT

**C**QLVLLPLKGDOI1NSKLVAGDLKAGVEVNRRDHGFGKEDIFKAVKTVMDVNKEPGASIRANQKWWREFLNLQ1QDKF1IADFVKDLKALA----- 475  
**C**QVVLMLQKGDOI1NAAKLVSGDMEAGVEINRRDEDGYFGKEDIKEAVEKVMVDEKDPGK1IRENQKKWKEFLNNKDIQSKY1GNLVNEMTAMAVSTT- 473  
**C**Q1VLVQVHQGEQ1LNARLMTTEMEAVEVE-REKGWFSRQSLENAVKSVMEEGS-E1GEVKRKNHDWKRCVLTDSGFDSDY1DKFEQNL1ELVKS--- 468  
**C**Q1VFT1HLGEQ1LNTRLMSEELKVSVEVK-REETGFSKESLSGAVSRVMDRDS-ELGNWARRRNHWKKESSLRGLMSGYLNKFVEALEKLVQNINLE 453  
**C**QLVLLPLRPFET1I1ARLMEQQLKVGVEVLEKDENDLFTKENLCKACEMCD----- 413  
**C**Q1VLLPQVGDQ1INARIMSVSLKVGVEVEKGEEDGVFSRESVCKAVAKVMDKEKS-E1IGREVRGNHDKLRGFLMNADLDSKYMDSFNQKLQDLLG- 459  
**C**QLVLLPQVGDQ1INARIMMSQNLKVGVEVEKGEEDGLFTGESVCRARVDAEVEGS-EVAKEVDRDNHAKMREFLNLKQLESSY1DNNFNKLLQDLLG- 457  
**C**QLVLLPQVGDQ1INSRLFQGGLDLAGVEVERNEENGSTKDGVC1AKMVNMDES-EEGRK1RANRAKWEFLSKGLEDSY1DGLVQKLQCLL----- 456  
**V**P1IAM1M0FDPY1PNARLMETVG-AG1EVGRDGE-GRLKREE1AAVVRKVVVEDSGES1REKAKELGE1MKKNMEAEVDG1V1ENLVKLEMNN----- 438  
**V**P1IGV1MAYEO1PSNAKVVVDNG-MGMVVPDRK1NQRLGGEVARV1KHVLQEEAKQIRRANE1SESMMK1GDAQMS-VVKEKLLQLVKKSE----- 452

Figure S8. Multiple alignment of flavonoid UGTs catalyzing glycosyl transfer to a sugar moiety of flavonoid glycosides.

Multiple alignments of deduced amino acid sequences of flavonoid GGTs was generated with CLUSTALW (<http://www.clustal.org/>). The PSPG motif is boxed. Amino acid residues conserved in flavonoid 2"-O-glycosyltransferases in UGT79/UGT94 are indicated with a red background. A3G2"GlCAT, anthocyanidin 3-O-glucoside 2"-O-glucuronosyltransferase; A3G2"GlCT, anthocyanidin 3-O-glucoside 2"-O-glucosyltransferase; A3G6"RhaT, anthocyanidin 3-O-glucoside 6"-O-rhamnosyltransferase; A3Ga2"XyIT, anthocyanidin 3-O-galactoside 2"-O-xylosyltransferase; F3G2"GlCT, flavonol 3-O-glucoside 2"-O-glycosyltransferase; F7G2"RhaT, flavanone 7-O-glucoside 2"-O-rhamnosyltransferase; Abbreviations for species: Ac, *Actinidia chinensis*; At, *Arabidopsis thaliana*; Bp, *Bellis perennis*; Cm, *Citrus maxima*; Ip, *Ipomoea purpurea*; Ph, *Petunia hybrida*.