Table 1 Suppl. Glycosyltransferases involved in flavonoid biosynthesis in *Arabidopsis thaliana* and horticultural plants. UGT - uridine diphosphate glucuronic acid transferase, UDP-Rha - uridine diphosphate-rhamnoside, 3-O-Rha - 3-O-rhamnoside, UDP-Glu - uridine diphosphate glucose, UDP-Ara - UDP-arabinose, UDP-Rha - UDP-rhamnoside, 3-O-Rha-7-O-Glu - 3-O-rhamnoside-7-O-glucose, 3-O-Glu-(1→2)-Glu - 3-O-glucose-(1→2)-glucose, 3-O-Glu - 3-O-glucose, Gal - galactose, Xal - xylose, Rut - rutinoside, Di-C-Glu - dihydrochalcone-C-glucose.

Species	UGT	Acession No.	Acceptor substrate	Donor substrate	Product	Reference
Arabidopsis thaliana	UGT78D1	AT1G30530	kaempferol, quercetin, isorhamnetin	UDP-Rha	3-O-Rha	Jones *et al.* 2003
	UGT78D2	AT5G17050	kaempferol, quercetin, isorhamnetin	UDP-Glu	3-O-Glu	Kim *et al.* 2012
	UGT78D3	AT5G17030	quercetin	UDP-Ara	3-O-Ara	Yonekura-Sakakibara *et al.* 2008
	UGT73C6	AT2G36790	kaempferol 3-O-Rha, quercetin 3-O-Rha	UDP-Glu	3-O-Rha-7-O-Glu	Jones *et al.* 2003
	UGT79B2	AT4G27560	cyanidin, cyanidin 3-O-Glu, quercetin, kaempferol	UDP-Rha	3-O-Rha	Li *et al.* 2017
	UGT79B3	AT4G27570	cyanidin, cyanidin 3-O-Glu, quercetin, kaempferol	UDP-Rha	3-O-Rha	
	UGT79B6	AT5G54010	kaempferol 3-O-Glu, quercetin 3-O-Glu	UDP-Glu	3-O-Glu-(1→2)-Glu	Yonekura-Sakakibara *et al.* 2014
	UGT89C1	AT1G06000	flavonol 3-O-glycosides	UDP-Rha	7-O-Rha	Yonekura-Sakakibara *et al.* 2007
	UGT73B1	AT4G34138	flavonoid	UDP-Glu	7-O-Glu	Kim *et al.* 2006
	AtF5GT	AT4G14090	flavonoid	UDP-Glu	5-O-Glu, 3-O-Glu	Tohge *et al.* 2005
Petunia hybrida	3GalT	AAD55985	kaempferol, quercetin	UDP-Gal	3-O-Gal	Miller *et al.* 1999
	PH1	AB027455	delphinidin 3-(p-Coumaroyl)-Rut	UDP-Glu	delphinidin 3-(p-coumaroyl)- Rut-5-O-Glu	Yamazaki *et al.* 2002
	PGT8	AB027454	flavonol, anthocyanidin	UDP-Glu	3-O-Glu, anthocyanidin 3-O-Glu	Knoch *et al.* 2018
	F3GT	BBE29003	kaempferol 3-O-Gal/Glu	UDP-Glu	kaempferol 3-O-Glu-(1→2)- G gal/Glu	
	PhF3GT	BAA89008	anthocyanin	UDP-Glu	3-O-Glu	Nakajima *et al.* 2001
	PhA5GT	BAA89009	anthocyanin	UDP-Glu	5-O-Glu	
	PhA3GRT	CAA50376	anthocyanidin	UDP-Rha	3-O-Glu	Kroon *et al.* 1994
Camellia sinensis	UGT72AM1	KY399734	flavonol, naringenin	UDP-Glu	3-O-Glu, 4′-O-Glu, 7-O-Glu	Cui *et al.* 2016
	UGT75L12	ALO19892	naringenin, apigenin, genistein, kaempferol	UDP-Glu	7-O-Glu	Dai *et al.* 2017

	UGT78A14	KP682360	quercetin，kaempferol，myricetin	UDP-Glu	3-O-Glu	Zhao *et al.* 2017
	UGT78A15	KP682361	quercetin，kaempferol，myricetin	UDP-Gal	3-O-Gal	
Fragaria × *ananassa*	FaGT1	AY663784	flavonol，anthocyanidin	UDP-Glu	3-O-Glu	Lunkenbein *et al.* 2006
	FaGT6	DQ289587	kaempferol，quercetin，isorhamnetin	UDP-Glu	3-O-Glu, 7-O-Glu, 4′-O-Glu, diglucoside	Griesser *et al.* 2008a,b
	FaGT7	DQ289588	kaempferol，quercetin，isorhamnetin	UDP-Glu	3-O-Glu, 7-O-Glu	
Actinidia chinensis	F3GT1	GU079683	cyanidin	UDP-Gal	cyanidin 3-O-Gal	Montefiori *et al.* 2011
	F3GGT1	FG404013	cyanidin 3-O-Gal	UDP-Xyl	cyanidin 3-O-Xyl-Gal	Crowhurst *et al.* 2008
	AcUFGT3a	AYJ72756	cyanidin	UDP-Gal	cyanidin 3-O-Gal	Liu *et al.* 2018a
Vitis vinifera	VvGT5	AB499074	kaempferol，quercetin，isorhamnetin	UDP-Glu A	3-O-Glu A	Ono *et al.* 2010a
	VvGT6	AB499075	kaempferol，quercetin，isorhamnetin	UDP-Glu, UDP-Gal	3-O-Glu, 3-O-Gal	
	VvGT1	AAB81682	flavonoid	UDP-Glu	3-O-Glu	Ford *et al.* 1998
Prunus persica	PpUGT78A1	ONI27510	cyanidin	UDP-Gal	cyanidin 3-O-Gal	International Peach Genome Initiative *et al.* 2013
	PpUGT78A2	XP_007224129	cyanidin	UDP-Glu	cyanidin 3-O-Glu	Cheng *et al.* 2014
Citrus maxima	1,2-RhaT	AY048882	flavanone 7-O-Glu	UDP-Rha	flavanone 7-O-Rha-(1→2)- Glu	Frydman *et al.* 2004
	CmF7G12RT	AAL06646	flavonoid-7-O-glycoside	UDP-Rha	flavonoid-7-O-glycoside 1,2-O-rhamnosyltranside	
Citrus sinensis	1,6-RhaT	DQ119035	flavanone 7-O-Glu	UDP-Rha	flavanone 7-O- Rha-(1→6)-Glu	Frydman *et al.* 2013
	CsUGT76F1	KDO69246	quercetin，kaempferol	UDP-Rha	7-O-Rha	Liu *et al.* 2018b
Citrus paradisi	Cp3GT	ACS15351	quercetin，kaempferol，myricetin	UDP-Glu	3-O-Glu	Devaiah *et al.* 2016
Citrus unshiu	CuCGT	LC131334	2-hydroxyflavanones，dihydrochalcone，mono-C-glucosides	UDP-Glu	Di-C-Glu	Ito *et al.* 2017
Fortunella crassifolia	FcCGT	LC131333	2-hydroxyflavanones，dihydrochalcone，mono-C-glucosides	UDP-Glu	Di-C-Glu	Ogata *et al.* 2005
Rosa hybrida	RhGT1	AB201048	cyanidin，cyanidin 5-O-Glu	UDP-Glu	cyanidin 5-O-Glu, cyanidin 3,5-O-Glu	
	RhA53GT	BAD99560	anthocyanidin	UDP-Glu	5,3-O-Glu	
Diospyros kaki	DkFGT	BAI40148	anthocyanidin，flavonol	UDP-Gal	3-Gal	Ikegami *et al.* 2009
Ginkgo biloba	UGT716A1	KX371617	flavonol，flavanone，flavone	UDP-Glu	3-O-Glu,4'-O-Glu,7-O-Glu	Su *et al.* 2017

Oryza sativa L.	OsFCGT	ABC94602	chrysin, apigenin, luteolin	UDP-Glu	2-hydroxyflavanones	Zhou *et al.* 2006
	OsUGT706D1	LOC_Os01g53460	apigenin,l Luteolin, chrysoeriol, eriodictyol, kaempferol, tricin, naringenin	UDP-Glu	7-O-Glu	Zhang *et al.* 2020
	OsUGT706C2	LOC_Os03g62480	apigenin, luteolin, chrysoeriol, eriodictyol, kaempferol, tricin, naringenin	UDP-Glu	7-O-Glu	
	OsUGT706C3	LOC_Os05g45100	luteolin	UDP-Glu	7-O-Glu	
	OsUGT88C3	Os01g53370	flavonol	UDP-Glu	7-O-Glu	Peng *et al.* 2017
	OsUGT707A2	LOC_Os07g32060	apigenin, luteolin, kaempferol, quercetin	UDP-Glu	5-O-Glu	
	OsUGT706B1	LOC_Os01g53420	kaempferol	UDP-Glu		
	OsUGT707A3	LOC_Os07g32020	kaempferol	UDP-Glu		
Zea mays L.	ZmFd3GT (bronze1)	GRMZM2g165390	anthocyanidin，flavonol	UDP-Glu	3-O-Glu	Ralston *et al.* 1988
	ZmUGT91L1	GRMZM2g180283	isoorientin	UDP-Rha	3-O-Rha	Casas *et al.* 2016
	ZmUGT708A6	GRMZM2g162783	naringenin, eriodictyol, luteolin, apigenin	UDP-Glu	naringenin O-hexosides, eriodictyol O-hexoside, naringenin di-O,O-hexosides, 6-C-glucosyl luteolin (isoorientin), 6-C-glucosyl apigenin (isovitexin), 6-C-glucosyl luteolin O-rhamnoside (maysin)	Falcone Ferreyra *et al.* 2013
	ZmUGT706D1	BAB68093	isoflavonoids	UDP-Glu	3-O-Glu	Ko *et al.* 2008
	ZmUGT707A3	BAC83989	flavonoid	UDP-Glu	3-O-Glu	
	ZmUGT706C1	BAB68090	flavonoid	UDP-Glu	7-O-Glu	
Glycine max (*Linn.*) Merr.	GmFd3GlcT	Glyma07g30180	cyanidin, kaempferol	UDP-Glu	3-O-Glu	Kovinich *et al.* 2010
	GmF3Glc6ppRhaT	Glyma10g33790	kaempferol 3-O-glucoside	UDP-Rha	kaempferol 3-O-rutinoside	Rojas Rodas *et al.* 2014
	GmF3Glc/Gal2ppGlcT	Glyma06g43880	kaempferol 3-O-glucoside	UDP-Rha	kaempferol 3-O-sophoroside	Di *et al.* 2015
	PvIFR1	Phvul002G033300	flavonoid, isoflavone	UDP-Glu	3-O-Glu	Meschini *et al.* 2008;
	GmIF7GT	AB292164	isoflavone	UDP-Glu	7-O-Glu	Noguchi *et al.* 2007
Solanum lycopersicum	SlFdAT1	Solyc12g088170	cyanidin-3-rutinoside, delphinidin-3-rutinoside, quercetin-3-rutinoside, kaempferol-3-rutinoside	UDP-Glu	5-O-Glu	Tohge *et al.* 2015
	SIFd3GT	Solyc10g083440	flavonoid, cyanidin	UDP-Glu	3-O-Glu	
Antirrhinum majus	AmC4GT	AB198665	chalcone	UDP-Glu	4'-O-Glu	Ono *et al.* 2006

Bellis perennis	BpUGAT	AB190262	anthocyanidin-3-O-glucoside	UDP-glucuronic acid	anthocyanidin-3-O-glucoside 2-O-glucuronoside	Sawada *et al.* 2005
Cleretum	DbB5GT	CAB56231	betanidin	UDP-Glu	5-O-Glu	Vogt *et al.* 1999
bellidiforme	DbB6GT	AAL57240	betanidin	UDP-Glu	6-O-Glu	
Forsythia intermedia	FiF3GT	AAD21086	flavonoid	UDP-Glu	3-O-Glu	Carmona *et al.* 2021
Glycyrrhiza echinata	GeIF7GT	BAC78438	isoflavonoid	UDP-Glu	7-O-Glu	Nagashima *et al.* 2004
Gentiana triflora	GtF3GT	BAA12737	flavonoid	UDP-Glu	3-O-Glu	Tanaka *et al.* 1996
Hordeum vulgare subsp. vulgare	HvF3GT	CAA33729	flavonoid	UDP-Glu	3-O-Glu	Wise *et al.* 1990
Ipomoea purpurea	IpA3G2GT	BAD95882	anthocyanidin	UDP-Glu	3-O-Glu	Morita *et al.* 2005
Linaria vulgaris	LvC4GT	BAE48240	chalcone	UDP-Glu	4'-O-Glu	Ono *et al.* 2006
Perilla	PfF3GT	BAA19659	flavonoid	UDP-Glu	3-O-Glu	Gong *et al.* 1997
frutescens	PfA5GT	BAA36421	anthocyanin	UDP-Glu	5-O-Glu	Yamazaki *et al.* 1999
Scutellaria	SbB7GAT	BAC98300	baicalein	UDP-Glu	7-O-Glu	Labate *et al.* 2010
baicalensis	SbF7GT	BAA83484	flavonoid	UDP-Glu	7-O-Glu	Hirotani *et al.* 2000
Rauvolfia serpentina	RsAS	CAC35167	hydroquinone	UDP-Glu	3-O-Glu	Arend *et al.* 2000
Torenia hybrid cultivar	ThA5GT	BAC54093	anthocyanin	UDP-Glu	5-O-Glu	Yamazaki *et al.* 2002
Glandularia hybrida	VhA5GT	BAA36423	anthocyanin	UDP-Glu	5-O-Glu	Yamazaki *et al.* 1999

Table 2 Suppl. Flavonoids participate in various pharmacological effects. SOD - superoxide dismutase, CAT - catalase, ROS - reactive oxygen species, GSH - glutathione, FMD - fasting mimicking diet, STZ - streptozotocin, PPARγ - peroxisome proliferator-activated receptor γ, PDE - phosphodiesterase.

Name	Structure	Molecular mass (g/mol)	Functions		References
Curcumin	$C_{21}H_{20}O_6$	368.39	antitumor	liver cancer, rectal cancer, breast cancer, pancreatic cancer, *etc*.	Giordano *et al.* 2019
Baicalein	$C_{15}H_{10}O_5$	270.24		liver cancer, breast cancer, stomach cancer, *etc*.	Liu *et al.* 2016
Galangin	$C_{15}H_{10}O_5$	270.24		liver cancer, breast cancer, stomach cancer, *etc*.	Fang *et al.* 2019
Lcariin	$C_{33}H_{40}O_{15}$	676.67		prostate cancer, lung cancer	Kashyap *et al.* 2018
Quercetin	$C_{15}H_{10}O_7$	302.24		liver cancer, stomach cancer, leukemia, lung cancer, kidney cancer, etc.	Vinayak *et al.* 2019
Luteolin	$C_{15}H_{10}O_6$	286.24		lung cancer, osteosarcoma, papillary thyroid carcinoma, tongue squamous cell carcinoma, *etc*.	Imran *et al.* 2019
Apigenin	$C_{15}H_{10}O_5$	270.24		liver cancer, lung cancer	Ahmed *et al.* 2021
Genistein	$C_{15}H_{10}O_5$	270.24		gastric cancer, cervical cancer, breast cancer, ovarian cancer, esophageal cancer, *etc*.	Tuli *et al.* 2019
Polyphenol theaflavin	$C_{29}H_{24}O_{12}$	564.49	anti-oxidation	increased SOD, CAT and other antioxidants, etc.	Subramanian *et al.* 1999
Catechin	$C_{15}H_{14}O_6$	290.27		decreased ROS and lipid peroxidation, increased antioxidants, *etc*.	Bernatoniene *et al.* 2018
Quercetin	$C_{15}H_{10}O_7$	302.24		increased SOD, CAT and other antioxidants, *etc*.	Boots *et al.* 2008
Proanthocyanidin	$C_{30}H_{26}O_{13}$	594.52		reduction expression of the enzyme nitric oxide synthase, increased antioxidants, *etc*.	Zhang *et al.* 2019b
Anthocyanin	$C_{15}H_{11}O_6$	287.24		increased GSH, increased the capacity of antioxidant, *etc*.	Zhang *et al.* 2021b
Kaempferol	$C_{15}H_{10}O_6$	286.24		increased antioxidants, *etc*.	Zheng *et al.* 2019
Panduratin A	$C_{26}H_{30}O_4$	406.51	antibacterial	*Staphylococcus aureus*, *etc*.	Cushnie and Lamb 2011
Isobavachalcone	$C_{20}H_{20}O_4$	324.37		*Staphylococcus aureus, Bacillus cereus, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Salmonella typhi*, *etc*.	Kuete *et al.* 2012
Kaempferol	$C_{15}H_{10}O_6$	286.24		methicillin-resistant *Staphylococcus aureus*, grammycin-resistant *Enterococcus*, *etc*.	Kumar *et al.* 2019

Isolupalbigenin	$C_{25}H_{26}O_5$	406.48		methicillin-resistant *Staphylococcus aureus*	Quesada *et al.* 2012
Flavone	$C_{15}H_{10}O_2$	222.24		*Staphylococcus aureus, Enterococcus faecalis, Salmonella typhi, Enterobacter cloacae, Enterobacter aerogenes, etc.*	Zhang *et al.* 2019a
Licochalcone A	$C_{21}H_{22}O_4$	338.40		*Staphylococcus aureus*	Wang *et al.* 2020
Chrysin	$C_{15}H_{10}O_4$	254.24	hypoglycemic	protection of STZ-induced diabetic nephropathy in rats, *etc.*	Premalatha *et al.* 2013
Quercetin	$C_{15}H_{10}O_7$	302.24		regulate blood sugar in many ways, including as PPARγ receptor co-agonists, *etc.*	Fang *et al.* 2008
Kaempferol	$C_{15}H_{10}O_6$	286.24			
Naringenin	$C_{15}H_{12}O_5$	272.25		protection of the pancreatic tissue of diabetic rats, *etc.*	Annadurai *et al.* 2012
Chlorogenic acid	$C_{16}H_{18}O_9$	354.31		activated protein kinase improves glucose and lipid metabolism, *etc.*	Ong *et al.* 2013
Luteolin	$C_{15}H_{10}O_6$	286.24		lower blood sugar through arachidonic acid metabolism pathway, *etc.*	Song *et al.* 2020
Epicatechin	$C_{15}H_{14}O_6$	290.27		Lower blood sugar by inhibiting intestinal transport of glucose, *etc.*	Lee *et al.* 2020
Gallic acid	$C_7H_6O_5$	170.12		Reduce blood glucose levels through PPAR-γ and Akt signaling pathways, *etc.*	Variya *et al.* 2020
Quercetin	$C_{15}H_{10}O_7$	302.24	vasodilation	improved biomarkers of endothelial function, *etc.*	Dower *et al.* 2015
Isoflavones	$C_{15}H_{10}O_2$	222.24		imroved FMD, *etc.*	Beavers *et al.* 2012
Flavone	$C_{15}H_{10}O_2$	222.24		lowered risk of cardiovascular diseases, *etc.*	Wang *et al.* 2014
Anthocyanin	$C_{15}H_{11}O_6$	287.24		prevention of hypertension, *etc.*	Cassidy *et al.* 2011
Naringenin	$C_{15}H_{12}O_5$	272.25		inhibition of PDEs in smooth muscle cells, *etc.*	Orallo *et al.* 2005
Delphinidin	$C_{15}H_{11}O_7$	303.30		Release of NO from endothelial cells through the activation of Ca^{2+} channels in endothelial cells, *etc.*	Ma *et al.* 2012
Quercetin	$C_{15}H_{10}O_7$	302.24	damage protection	anti-cardiomyocyte apoptosis, *etc.*	Hertog *et al.* 1993
Kaempferol	$C_{15}H_{10}O_6$	286.24			
Myricetin	$C_{15}H_{10}O_8$	318.24		anti-atherosclerosis, anti-platelet activity, *etc.*	Griffiths *et al.* 2016
Apigenin	$C_{15}H_{10}O_5$	270.24			
Luteolin	$C_{15}H_{10}O_6$	286.24			
Pentamethylquercetin	$C_{20}H_{20}O_7$	372.24		anti-atherosclerosis, *etc.*	Du *et al.* 2019

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