Supplementary data file

**Functional characterization of three flavonoid glycosyltransferases from *Andrographis paniculata***

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## Fig. S1 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme products using Apigenin (1) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 1 and enzyme products 1a ,1b and 1c. Peak for the authentic standard apigetrin is 1c’; (B1), (B2), and (B3) Typical positive ion MS spectra for 1c,1b and 1a.

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## Fig. S2 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using Wogonin (2) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 2 and enzyme product 2a; (B) Typical positive ion MS spectra for 2a.

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## Fig. S3 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme products using Luteolin (3) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 3 and enzyme products 3a, 3b, 3c, 3d and 3e; (B1), (B2), (B3), (B4), and (B5) Typical positive ion MS spectra for 3e, 3d, 3c, 3b and 3a.

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## Fig. S4 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using Chrysin (4) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 4 and enzyme product 4a; (B) Typical positive ion MS spectra for 4a.

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## Fig. S5 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using Acacetin (5) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 5 and enzyme product 5a; (B) Typical positive ion MS spectra for 5a.

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## Fig. S6 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using Oroxylin A (6) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 6 and enzyme product 6a; (B) Typical positive ion MS spectra for 6a.

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## Fig. S7 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme products using Kaempferol (7) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 7 and enzyme products 7a, 7b, 7c, 7d and 7e. Peak for the authentic standard populnin is 7d’; (B1), (B2), (B3), (B4), and (B5) Typical positive ion MS spectra for 7e, 7d, 7c, 7b and 7a.

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## Fig. S8 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme products using Naringenin (8) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 8 and enzyme products 8a and 8b. Peak for the authentic standard prunin is 8a’; (B1) and (B2) Typical positive ion MS spectra for 8b and 8a.

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## Fig. S9 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme products using daidzein (9) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 9 and enzyme products 9a and 9b. Peak for the authentic standard daidzin is 9a’; (B1) and (B2) Typical positive ion MS spectra for 9b and 9a.

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**Fig. S10** UPLC-Q-TOF-MS analysis of ApUGT enzyme products using genistein (**10**) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of **10** and enzyme products **10a, 10b, 10c**. Peak for the authentic standard genistin is **10b’**, peak for the authentic standard sophoricoside is **10c’**; (B1), (B2), and (B3) Typical positive ion MS spectrafor **10c, 10b** and **10a**.

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## Fig. S11. UPLC-Q-TOF-MS analysis of ApUFGTs enzyme products using phloretin (11) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 11 and enzyme products 11a, 11b, 11c and 11d; (B1), (B2), (B3), and (B4) Typical positive ion MS spectra for 11d, 11c, 11b and 11a.

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## Fig. S12 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using 4-Methylumbelliferone (12) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 12 and enzyme product 12a; (B) Typical positive ion MS spectra for 12a.

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## Fig. S13 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using 7-Amino-4-

## methylcoumarine (13) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 13 and enzyme product 13a; (B) Typical positive ion MS spectra for 13a.

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## Fig. S14 UPLC-Q-TOF-MS analysis of ApUFGTs enzyme product using Nodakenetin (14) as an aglycon acceptor. (A) UPLC chromatogram and UV spectra of 14 and enzyme product 14a; (B) Typical positive ion MS spectra for 14a.