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Systematic nomenclatures of soybean saponins by combination of aglycone and sugar chain structures

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Soyasaponins, a group of triterpene glycosides, consist of more than 200 natural seconderry molecules in soybeans. They are currently divided into Group A, DDMP, and Sg-6 saponins depending on the aglycone soyasapogenol structure. Despite their unclear biosynthetic pathways, the structural diversity suggests at least 19 different genes involved in the biosynthesis: 1 β-amyrin synthase, 5 CYP450s, 8 UDP-dependent glycosyltransferases, 1 DDMPtransferase, 1 dehydratase, 1 malonyltransferase and 2 acetyltransferases. The profile analysis, a newly developed technique to elucidates the chemical structure of soyasaponin without purification and NMR analysis, has identified many new soyasaponins having new aglycone from Chinese wild soybean collections. However, there is no systematic nomenclatures for them. Historically, group A saponins Aa, Ab, Ac, Ad, Ae and Af are maned by HPLC elution order, and there is no relation between the sugar sequences. Whereas, αg, βg, γg, αa, βa, and γa in the DDMP saponin names represent combinations of the third suger, Glc(α), Rham(β) or no sugar(γ), and the second sugar Gal(g) or Ara(a) attaching to the first GlcUA moiety of the C-3 sugar chain. Accordingly, we have developed a naming system for any new soyasaponins with the aglycone and the C-3 sugar chain of DDMP saponins. A new saponin KA-αg has an αg sugar sequence (Glc-Gal-GlcUA-) at the C-3 position, and a new aglycone soyasapogenol KA (21-OH, 22-OH, 29-CH2-O-acetyl) which has a structural combination of soyasapogenol K (22=O, 29-CH2-O-acetyl) and soyasapogenol A (21-OH, 22-OH).