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The leaves of Mediterranean mandarin could be used as an important source of hesperidin, nobiletin and tangeretin.

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Citrus are rich in flavonoids such as flavones and flavanones. Recent studies have shown that these phytonutrients play a beneficial role for human health. Citrus plants can contain high levels of hesperidin, a flavanone which is effective in the treatment of chronic venous insufficiency. Nobiletin and tangeretin are two polymethoxylated flavones. Nobiletin has been shown to increase hepatic insulin sensitivity and decrease atherosclerosis. Tangeretin may have antiproliferative and anticarcinogenic effects by blocking MAPKs activation and ROS generation. Studies on flavonoids from citrus are generally focussed on ripe fruits and on one group of metabolites. The aim of this study is to quantify accurately all groups of flavonoid from leaves of mandarin (*Citrus deliciosa*). Flavones and flavanones analysis was carried out by liquid chromatography and mass spectrometry (LC-MS) using a new generation column. Moreover, a specific gradient was designed to evaluate both flavanones and methoxylated flavones. This method was applied to leaves from mandarin tree. All leaves were fully-expanded, and were about one-year-old from the spring flush of the previous season. They were of similar height above the ground, had the same east orientation and experienced similar exposure to light. Comparison of metabolite levels revealed that mandarin leaves were rich in hesperidin, nobiletin and tangeretin. Interestingly, nobiletin and tangeretin also accumulated in high level.

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Comparative study of fruit flavonoids in ten citrus hybrids

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Citrus species are a rich source of flavonoids. Numerous epidemiological, clinical, and preclinical studies have shown that citrus flavonoids have an anti-inflammatory, anti-cancer, anti-atherosclerosis, antioxidant and anti-bacterial activities. Many relevant research reports about citrus flavonoids were focused on the determination of flavonoids in different orange and mandarin varieties, and a little about citrus hybrids. In this study, 10 citrus hybrids cultivated in Chongqing city, China, were analyzed for 8 flavanone glycosides (FGs) and 3 polymethoxylated flavones (PMFs) by the ultra performance liquid chromatography (UPLC). The results showed that the total flavonoids in juice are much lower than those in peel. Of all the samples, the total flavonoids in 'Kiyomi' tangor fruit was the highest, followed by 'Wanmi No.3' and 'Wanmi No.1'. The range of the total flavonoid concentration in all juice was from 0.13 to 0.42 mg/g, and from 4.8 to 20.0 mg/g in peel. The most abundant flavonoids in 10 citrus hybrids were hesperidin, narirutin, didymin and polymethoxylated flavones. The largest amount of narirutin was found in peel of 'Kiyomi' tangor, which was 3.87 mg/g; while the largest amount of hesperidin and didymin were found in peel of 'Wanmi No.3', with the concentration of 16.07 mg/g and 1.89 mg/g, respectively. Furthermore, neohesperidin was only found in 'Niushen' hybrid; the content in Niushen's peel was 4.88 mg/g. The content of total polymethoxylated flavones in 'Jucheng 1-1232' was the highest of the 10 analysed citrus hybrids, which was 0.94 mg/g.

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Over-consumption of satsuma mandarins is associated with "Shang huo" reaction: results from case-control studies

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Satsuma mandarin accounted for a large proportion of citrus varieties. It is rich in carotenoids, limonoids and some other important functional components, potentially beneficial for human health. Over-consumption