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ANTHOCYANIN PROFILE OF RED ONION IS AFFECTED BY MICROWAVE-ASSISTED EXTRACTION CONDITIONS

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Abstract:

During the last years there is an increased interest in new environmental-friendly extraction techniques. Among them, microwave-assisted extraction (MAE) can be highlighted. MAE relies on the fast heating generated by the microwaves to facilitate the migration of the interest compounds from the matrix to the extraction solution, showing as advantages a reduced extraction time and the use of low solvent volume. However, the effect of MAE on the anthocyanin profile is still contradictory. Anthocyanins are red to blue hydrophilic pigments widely distributed in the plant kingdom. The effect of MAE on the anthocyanin profile of lyophilized red onion was studied by means of a factorial experimental design (2^3) in which the independent variables were HCl concentration (0.3 – 0.7%), temperature (90 – 110°C) and volume of acidified methanol (28 - 42 mL). In addition, a 4 point steepest ascent (SPA) was carried out with the same variables with the following levels: HCl concentration of 0.10 and 0.25%, temperature of 70 and 85°C and volume of acidified methanol of 45 and 54 mL. In both cases, the response variables were the concentrations of succinyl-derivatives, malonyl-derivatives and non-acylated anthocyanins (Figure 1). The samples were subjected to a maximum power of 850 W for 1 min to allow the solution to reach the set temperature and after that; the temperature was maintained constant for 5 min at 350 W. The anthocyanins were determined by HPLC-DAD-MS/MS [1]. Large volumes of acidified methanol and low temperatures exerted positive effect on the total anthocyanin content. Low HCl concentration, low temperature and small volume of acidified methanol favored the extraction of malonyl-derivatives, while the extraction of succinyl-derivatives was favored by high HCl concentration, high temperature and low solvent volume. The number of mono or disaccharides bond in the anthocyanin molecule did not result in the preferential extraction of these compounds under the tested conditions. There was no evidence that the anthocyanins are degraded to low molecular weight compounds during MAE under the tested conditions.

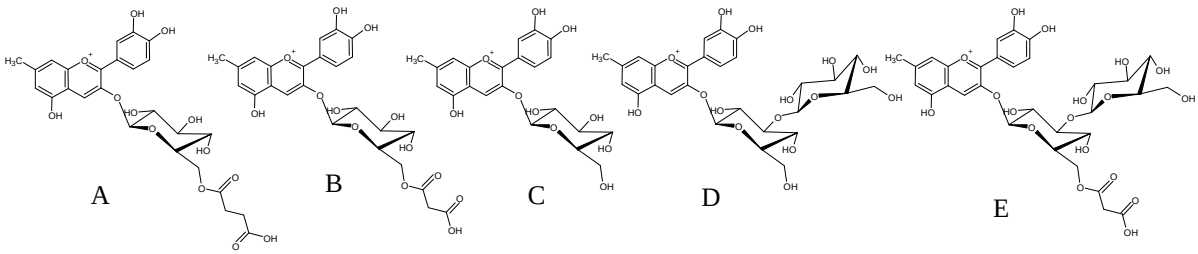

Figure 1: Chemical structure of anthocyanins. (A) cyanidin 3-succinyl glycoside, (B) cyanidin 3-malonyl glycoside, (C) cyanidin 3-glucoside, (D) cyanidin 3-glucosil-glucoside and (E) cyanidin [3-(glucosyl)-6-(malonyl)glucoside]-4'-glucoside.

References:

[1] Faria, A. F.; Marques, M. C.; Mercadante, A. Z. 2011. Identification of bioactive compounds from jambolão (*Syzygium cumini*) and antioxidant capacity evaluation in different pH conditions. Food Chemistry, 126: 1571-1578.