

FLAVONOID PROFILING OF CITRUS PEELS BY DART-HRMS

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Citrus fruits rank among the most widely cultivated and consumed fruits worldwide. Brazil stands out as one of the leading producers, not only in cultivation but also in the processing industry. As a result, millions of tons of waste are generated annually, contributing to potential environmental impacts. However, this by-product represents a valuable source of bioactive metabolites, particularly flavonoids and limonoids. Direct analysis of these raw materials, without the need for sample preparation, is crucial for obtaining a comprehensive and reliable characterization of the chemical profile of natural products. The aim of this study was to analyze the flavonoid composition of fresh peels from different citrus fruits using the DART-HRMS technique. The outer peels of various citrus fruits (lemons, oranges, and tangerines) were cut into pieces measuring 0.5 cm in width × 2.0 cm in height, placed on a QuickStrip® support, and subsequently analyzed by DART-HRMS. Samples were examined in both ionization modes (positive and negative) within the 70–1050 Da range. Mass spectra were processed using Xcalibur software, version 4.2 (Thermo Fisher Scientific), and interpreted based on comparison with literature data. Through the targeted analysis, both methoxylated and glycosylated flavonoids were identified across the different samples, compounds that are well-documented as characteristic of citrus fruits. Among the detected metabolites, ions corresponding to nobiletin (m/z 403.1400), tangeretin (m/z 373.1278), heptamethoxyflavone (m/z 433.1487), naringin/narirutin (m/z 581.1853), eriocitrin (m/z 597.1778), and hesperidin (m/z 611.1856) were observed. These findings demonstrate that DART-HRMS is an effective tool for the direct detection of metabolites in raw plant material, including those previously described in citrus extracts. The method is rapid, solvent-free, requires only a small amount of sample, and can be extended to the analysis of other natural products.

Keywords: Citrus, DART-HRMS, glycosylated flavonoids, and methoxylated flavonoid.

