

Title A new liquid chromatography tandem ultra high definition accurate mass spectrometry method for the simultaneous quantitation of nine plant hormones in fruits and vegetables

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Abstract

Plant hormones are important molecules which at low concentration can regulate various postharvest physiological processes. Mass spectrometry has become a powerful technique for the quantitation of multiple classes of plant hormones because of its high sensitivity and selectivity. We have developed a new ultra high performance liquid chromatography-tandem high definition accurate mass spectrometry method (UPLC-Q-TOF MS/MS) for simultaneous determination of nine key plant hormones (abscisic acid (ABA) and four ABA metabolites, cytokinins (zeatin, zeatin riboside) and gibberellins (GA1, GA4). The compounds were extracted with methanol-water-formic acid, purified by Sep-Pack plus C18 and Oasis MCX cartridges, and separated and quantified by UPLC Q-TOF MS/MS using an electrospray ionization source in both negative and positive modes. The method was validated by determining the linearity ($R^2 \sim 0.995$) over the concentration range of 5 - 150 ng/mL for most compounds. The limits of detection (LODs) of the technique, for example, ranged between 0.17 and 1.65 ng/mL for abscisic acid-glucose ester (ABA-GE) and phaseic acid (PA) respectively, with limits of quantitation (LOQs) between 0.57 and 5.50 ng/mL, respectively. Reproducibility of the method was obtained with intra-day and inter-day relative standards deviations ($\leq 12\%$) and accuracies for compounds typically ranging between 91- 113. Recovery yields were evaluated on tissues from different fresh produce types, *viz.*, potato tubers, onion bulb flesh, strawberries and peaches, using SPE C18 cartridges. The potential postharvest applications of using this new method to simultaneously quantify a series of physiologically important plant hormones and the advantages of the assay over previous traditional mass spectrometry methods will be discussed.