

Method validation and impact of curing on newer pesticide molecules in cardamom using liquid chromatography-tandem mass spectrometer

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In the present study, a modified QuEChERS method was validated for detection of acetamiprid, azoxystrobin, clothianidin, chlorantraniliprole, emamectin benzoate, fluopyram, fipronil, imidacloprid, spinetoram J, spinetoram L, thiacloprid, tricyclazole and tebuconazole pesticide residues in six cardamom matrices (whole, pericarp and seed of green and cured cardamom). The standardized modified QuEChERS method showed recoveries within the acceptable range (80–115%). Analysis of whole, pericarp and seed matrices of fresh and cured cardamom revealed that the frequency and quantity of detected pesticide residues were significant in pericarp than seed. The hazard quotient (HQ) value for detected pesticide residues was <1 inferring acceptable risk to consumers. Fresh and cured cardamom samples collected and analysed from processing units located at Theni district showed 83.34–99.54% loss of imidacloprid and 45.71–75.2% loss of chlorantraniliprole residues due to curing.

Keywords: Fresh and cured cardamom, LC-MS/MS, pesticide residues, QuEChERS.

linked to food safety, that too if maximum residual limits (MRL) are exceeded. India's cardamom export dropped by 27% in 2019–20 valued at Rs 426.30 crore as they failed to meet Saudi Arabia chemical residue norms⁶. Pesticide residue monitoring in cardamom has become mandatory to comply with the MRL requirements of the importing countries in order to protect farmers from financial losses⁷.

Determination of pesticide residues is a microanalysis process employing sophisticated analytical equipments. Liquid chromatography is one such technique employed for the determination of diafenthiuron^{8,9}; flubendiamide and its metabolite² and acetamiprid, imidacloprid and six metabolites¹⁰ in fresh and cured cardamom. Not only precise quantification but also multi-residue extraction is challenging in cardamom. Keeping these points in mind, a simple, quick and effective method was validated in the present study for newer pesticides used in cardamom cultivation using liquid chromatography with tandem mass spectrometer.

Material and methods