



Área: ANA

## Determination of pesticides in olive leaves using QuEChERS and LC-MS/MS

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### Highlights

QuEChERS method for olive leaves was proposed; Pesticides residues were determined by LC-MS/MS; Tebuconazole and lufenuron were detected in olive leaves;

### Abstract

Pesticides are widely applied in agriculture to control harmful organisms but their residues may persist on crops and pose risks to human health. Olive leaves are rich in bioactive compounds and traditionally consumed in medicinal teas, demanding attention regarding pesticide contamination, especially in the absence of regulatory standards<sup>[1]</sup>. In this study, ten pesticides were investigated (carbendazim, dimethoate, thiamethoxam, tebuconazole, kresoxim-methyl, thiophanate-methyl, pyraclostrobin, azoxystrobin, difenoconazole and lufenuron) in olive leaves using the QuEChERS method followed by Liquid Chromatography tandem Mass Spectrometry (LC-MS/MS). Different QuEChERS variants were evaluated, including the original version<sup>[2]</sup>, which resulted in recoveries between 42 and 77%. A modified acetate version<sup>[3]</sup>, adopted in this study, showed the best performance, providing recoveries between 56 and 92% and acceptable precision according to international validation guidelines. The method was applied with slight modifications: sample mass (2 g), extraction solvent (15 mL MeCN, 1% CH<sub>3</sub>COOH), salts (6 g MgSO<sub>4</sub> + 1.5 g CH<sub>3</sub>COONa), and a cleanup step (50 mg PSA and 150 mg MgSO<sub>4</sub>). Matrix effects were observed, with signal suppression ranging from –72 to –8%, but could be compensated by matrix-matched calibration. Among the target analytes, tebuconazole was detected at 0.67 mg·kg<sup>-1</sup> and lufenuron at <0.038 mg·kg<sup>-1</sup>, while the remaining pesticides were not detected. Tebuconazole, a triazole fungicide with the potential to cause adverse effects, has more recently been associated with additional risks. A new assessment conducted by the European Food Safety Authority (EFSA) in 2019<sup>[4]</sup> raised further concerns, particularly regarding its endocrine-disrupting properties, which may affect thyroid gland function. The compound has been classified as toxic to birds and mammals. In 2023<sup>[5]</sup> the European Commission published a regulation determining the non-renewal of tebuconazole approval within the European Union, leading to the revocation of the product authorizations and its gradual market withdrawal. Although the levels detected in this study are below the established maximum residue limits (MRLs), the absence of specific regulations for olive leaves in Brazil highlights the need for monitoring and reinforces the importance of developing reliable and sustainable analytical approaches.

### References

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