

Application Note AN-NIR-137

Fat content analysis in olive pomace with NIR spectroscopy

Determination of fat content in a few seconds

Olive pomace is the main residue of the olive oil extraction process. It is a thick sludge – the remaining pulpy material after most of the oil is removed from the olive paste. To extract the remaining oil it contains, the olive pomace is treated with solvents. After refining and mixing this with edible virgin olive oil for flavor, aroma, and color, olive pomace oil is obtained. Olive pomace oil is used in cooking for its milder flavor and stability at high temperatures [1], as well as being nutritionally relevant due to its high oleic acid content (C18:1) [2]. Olive pomace fat analysis is necessary to check the efficiency of the oil removal process. The official method to determine this requires a time-consuming drying step followed by solvent extraction. Near-infrared spectroscopy (NIRS) is a fast, chemical-free method for olive pomace testing without any sample preparation.

EXPERIMENTAL EQUIPMENT

140 samples of olive pomace were measured on a Metrohm NIR Analyzer. All measurements were performed in reflection mode (1000–2250 nm) using the large cup accessory. The samples were measured in rotation to collect spectral data from several areas. Spectral averaging of signals from several spots helped to reduce sample inhomogeneity. Metrohm software was used for all data acquisition and prediction model development.

RESULTS

The obtained NIR spectra of olive pomace samples (Figure 1) were used to create a prediction model for quantification of fat content. The quality of the prediction model was evaluated using a correlation diagram (Figure 2) which displays a high correlation between the NIR prediction and the reference values measured with Soxhlet extraction. The respective figures of merit (FOM) display the expected precision of a prediction during routine analysis.

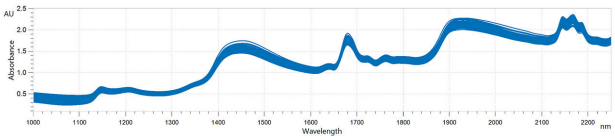


Figure 1. NIR spectra of olive pomace samples measured with a Metrohm NIR Analyzer.

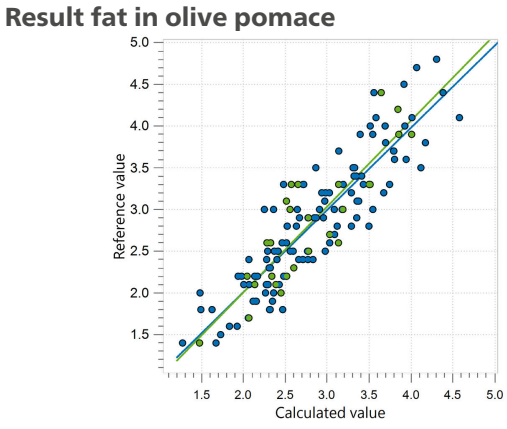


Figure 2. Correlation diagram and the respective FOMs for the prediction of fat content in olive pomace using a Metrohm NIR Analyzer.

R^2	SEC (%)	SECV (%)	SEP (%)
0.752	0.33	0.35	0.37

CONCLUSION

This Application Note shows the feasibility of using NIR spectroscopy for olive pomace fat analysis. By using NIRS, chemical-free analysis can be conducted within seconds—a quick, easy, cost-effective alternative to determine the efficiency of the olive pomace oil removal process.

REFERENCES

1. *Olive Pomace - an overview | ScienceDirect Topics.* https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/olive-pomace (accessed 2025-06-18).
2. González-Rámila, S.; Sarriá, B.; Seguido, M. Á.; et al. Effect of Olive Pomace Oil on Cardiovascular Health and Associated Pathologies. *Nutrients* **2022**, *14* (19), 3927. DOI:10.3390/nu14193927

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